IN THE UNITED STATES DISTRICT COURT

FOR THE WESTERN DISTRICT OF WISCONSIN

MENARD, INC.,)
)
Plaintiff,)
) Civil No. 3:18-CV-00844
vs.)
)
TEXTRON AVIATION, INC.,)
DALLAS AIRMOTIVE, INC., and)
PRATT & WHITNEY CANADA)
INTERNATIONAL, INC.,)
)
Defendants.)

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AARON JONES, DEPONENT, SWORN

EXAMINATION

BY MS. RATHKE:

Q Okay. Could you please state and spell your name for the record?

A Aaron J. Jones. A-A-R-O-N J. J-O-N-E-S.

Q And where do you reside, sir?

A In Bolingbrook, Illinois.

Q And where are you employed?

A I'm employed at Fusion Engineering.

Q And are you a retained expert in this matter?

A Yes, I am.

Q Okay. And by whom are you retained?

A I was retained by Mr. Mariani for Dallas Airmotive.

Q And when did that occur?

A I think Mr. Mariani contacted my firm when -- it was sometime in July of 2019. I was out of the country.

Q And you said July?

A Yes, I believe so.

Q Okay. And how long between when Mr. Mariani formally -- sorry. Strike that.

How long between when Mr. Mariani first

contacted you and how long did it take you to then become formally engaged?
A I don't recall exactly, but within a week.
Q Okay. And what charge were you given in this case? What were your directions?
A To investigate the cause of failure of the subject diffuser bolts.
Q Okay. And what is it that you consider yourself to be an expert in?
A I consider myself to be an expert in metallurgy and mechanics.
(Exhibit No. 91 marked.)
BY MS. RATHKE:
Q All right. And if you look at your screen -- hopefully you can access Exhibit 91. Are you able to do that?
A Is that my report?
Q Yes.
A Yes. I have it open.
Q Okay. Great.
And I think the way that it works is you drive the exhibit on your screen, and I drive the exhibit on my screen, and Mr. Mariani drives the exhibit on his screen. So -- and if you

prefer to work off of a hard copy, that's fine with me too.
A That would be excellent. I apologize because my eyes are not as good as they used to be.
Q I know. This is -- there is no system that's a perfect system, but this one is particularly challenging in that it's new and it relies on all this technology.
So if I can -- I think maybe start on Appendix B of your expert report that sets forth your CV. If you can join me there.
A And I apologize. I'm having a little bit of a hard time hearing you for some reason.
Q All right. Let's see.
A I have the --
Q I will speak louder.
A That's perfect. I'm sorry to do that to you.
Q No. That's quite all right. Speaking louder, I can handle.
Okay. All right. So are you at Appendix B of your expert report, which is your CV?
A That is correct.
Q All right. So in the first section of your CV, there's a chart that sets forth areas of

expertise. Do you see that?
A Yes.
Q Okay. What percentage of your -- let's say within the last five years.
What percentage of your work has been relating to automotive engineering and issues?
A It varies from year to year, but I would say between automotive and truck, distinguishing the two -- combining the two, probably 40 to 50 percent. It depends.
Q And indeed that's the work that you do for our firm presently; fair to say?
A I do work for your firm and other firms as well.
Q Okay. But for our firm it's in the automotive?
A Including your firm.
Did you -- I'm sorry, did you want the answer or the question?
I think you missed that. Can we start that over?
(Record read.)
MR. MARIANI: I just need you to answer that question. He didn't hear your answer, so the reporter repeated the question. So can you answer what -- if that's correct, that you do --

the firm you do -- the work you do for Sarah's firm is in automotive and trucking.
THE DEPONENT: Yes, that's correct.
BY MS. RATHKE:
Q All right. And what proportion of your work within the last five years involves aviation or aerospace issues?
A Maybe 20 percent; 15 to 20.
Q And what makes up the balance of your work?
A I do a lot of industrial consulting, failure analysis-related work for industrial clients that are unrelated to litigation. Typically that's in the area of materials failure analysis, truck and bus engineering. We also do a lot of insurance claims related to any number of things.
Q And what percentage of your work is what you just mentioned constitute?
A The balance.
Q Okay. So something on the order of 30 percent or so? 30 to 40?
A Of the industrial-related work, yes. It's probably 30 percent, in that range.
Q Okay. And when you mentioned your industrial

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work just now, you included some consulting work, non-litigation work relating, I think, to automotive. Did I understand that correctly?
A We do failure analysis on a variety of things. Anything for industrial clients from steam turbines to even -- we even do some aircraft-related failures as well. Basically whatever comes in the door in terms of industrial consulting that a client wants failure analysis performed.
Q Okay. So let me ask a follow-up question that is a little different from the question that I first asked. So what proportion, approximately, of your work in the last five years has related to automotive products, whether that be from litigation or in industrial consulting?
A I've never really -- that's a good question. I've never really tried to break it down, but I would say -- my estimate would be, you know, 40 to 50 percent.
Q Okay. I'm sure I knew this at one point, but your CV indicates that you're a Ph.D. candidate. Do you plan to complete that?
A I was at one time, but I don't think so anymore.

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Q Okay. And what would that have been in? Materials engineering?
A It would have been another hydrid materials mechanical engineering.
Q Okay. And walk me through your professional experience starting from, let's say when you graduated from college in 1995; is that right?
A I graduated the first time in 1995, that's correct.
Q Okay. Walk me through your professional history since that time.
A Sure. Well, in 1995, I started out as an intern and I spent some time at a company called National Recovery Systems. They are a steel mill dust recycler, if you will -- what they did concentrate their work in is taking the vast amount of steel mill, steel-making waste and generating that waste into recyclable or reusable ore substitutes; in other words, what we were trying to do is increase their recovery yield of iron from the iron-making waste that was generated during the process.
After that, I moved to Packer Engineering in Naperville, Illinois. I started out there,

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as a staff engineer in the materials department. I worked in the materials department. Worked up through materials department, and then joined and worked conjunctively with the mechanical and transportation department. And from there I was promoted up -- I think I left Packer Engineering as a senior director of materials and transportation engineering.
Q And you were there for approximately, what, 14 years? 13 years?
A 12. 13. I remember left in earlier 2011.
Q And at Packer Engineering, were there any particular products or materials that you specialized in or focused on?
A Failure analysis, general failure analysis. We did a lot of automotive work. We did quite a bit of turbine -- steam turbine-type work, and some fire-related work as well.
Q Do you do fire investigations now?
A Unfortunately, yes.
Q And what percentage of your work does that consist of?
A It depends from year to year. Right now, the vast majority of the fire investigation work

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that I do is for a few companies that I've worked for for about the last 15 years, and I do that mostly on an industrial consulting basis.
Q Okay. And what percentage of your current work flow, let's say in the past five years, consists of fire investigations for those clients?
A Oh, probably 10, 15 percent. I lump that into the industrial consulting.
Q Okay. All right. So at Packer Engineering -- where did you go after Packer Engineering?
A I went to a company called ITC Experts.
Q And what did you do there?
A The same work that I was doing at Packer Engineering: Industrial failure analysis, litigation-related consulting in materials and transportation world.
Q Is ITC Experts, is that a manufacturing firm?
A No. It was a consulting firm.
Q Okay. Is that your first time working for a consulting firm?
A No. Packer Engineering was a consulting firm.
Q Okay. All right. Where did you go after ITC Experts?
A I went to a company called Caulfield

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Engineering.
Q And what did you do there?
A The same work that I've been doing. If your question was related to aviation-related work, I began doing aviation-related work in -- when I started at ITC, and that continued at Caulfield Engineering.
Q And what were the circumstances in which you first encountered, you know, your first aviation project or investigation?
A I can't -- probably one of my first investigations was with Steve Meyers actually.
Q Tell me about that.
A I don't remember which one it would've been. There was a couple failure analyses, small failure analysis that I did with Steve when he was at ITC Experts. Then there was a case that I did -- I don't know if Steve was involved with it. It was a landing gear case at ITC. I worked on that fuel system case with you and Steve at Caulfield -- or at ITC. Excuse me.
Also, I think I mentioned the landing gear case, and I'm trying to remember. We're going back a while now, but things of that nature back

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then. I believe the first case I had worked on with Steve was an engine case, but I could be mistaken.
Q And sum total in your professional career, how many matters have you had involving aviation issues?
A I couldn't tell you in my career. I could tell you in the last few years if you wanted an accurate answer.
Q Okay.
A I could tell you last year besides this case, I was involved in three others. And the year before that I think I was involved in three or four others as well.
Q Okay. And do you have any special training or education in the aviation field?
A As it relates to?
Q Anything.
MR. MARIANI: Objection to the form. Vague.
THE DEPONENT: I don't have an education in aircraft -- I don't have an education in aircraft maintenance or anything like that. I just have my engineering background.

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BY MS. RATHKE:
Q Any classes specialized to aircraft or aviation issues?
MR. MARIANI: Objection.
THE DEPONENT: I would consider all of my engineering and mechanics courses related to aircraft, as well as all the failure analysis courses and other things I've taken over the years --
BY MS. RATHKE:
Q Have you had any classes --
A -- and professional development.
Q Have you had any classes or trainings that are specific to aviation?
MR. MARIANI: Objection to the form.
THE DEPONENT: Not that I recall.
BY MS. RATHKE:
Q Okay. The next page of your CV starts with a section for "Education and Continuing Education."
A Yes.
Q Do you see that?
A Yes.
Q Is this a complete list?

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A No. It would be -- no. I've taken some other continuing education courses related to fire investigation in the last six months.
Q Anything else?
A No. That's all that I can recall at the moment.
Q Okay. And on your license section, are all of your -- first of all, is this a complete list of your licenses?
A Yes.
Q And are all of them current today?
A Yes.
Q Do you have a professional engineer license for the State of Wisconsin?
A No.
Q Next on your CV is a section for "Affiliations and Memberships." Do you see that?
A Yes.
Q Is this a complete list, what you've set forth in this Exhibit 91?
A Yes. Actually I am about to not be a member of the National Society of Professional Engineers anymore.
Q And why is that?
A Because the dues are outrageous and I really

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don't get much from it.
Q Okay. Other than that, are all of the affiliations and memberships set forth in Exhibit 91, are they current?
A Yes.
Q Have you ever held any professional memberships relating to aviation specifically?
MR. MARIANI: Objection to the form. Vague.
You can answer.
THE DEPONENT: Other than the Society of Automotive Engineers, which also has an aerospace division, no.
BY MS. RATHKE:
Q Are you a member of the aerospace division?
A I don't believe it's separated that way.
Q Are there separate meetings for the aerospace division?
A Truthfully, I don't know.
Q Have you ever attended any aviation -- any aerospace meetings?
A Of the SAE?
Q Yes.
A No, not that I recall.

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Q The next section of your CV set forth in Exhibit 91 relates to "Editorial and Peer Review and Professional Committees."
Do you see that?
A Yes.
Q Is the list set forth there in Exhibit 91, is that a full and current list?
A Yeah. One thing I would note that, yes, there's one missing, and I would note that there's an error in my resume. It says associate editor. I'm a peer reviewer on line No. 1.
Q Okay.
A I'm an editorial review board. There's a misprint when my resume was changed over.
Also, I've also recently performed peer review on two or three different sections of the upcoming ASM handbook series related to microscopy, electron microscopy, and chemical analysis.
Q And have you ever conducted any peer review or editorial activities relating to work product discussing aviation issues specifically?
MR. MARIANI: Objection to the form. Vague.

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THE DEPONENT: I'm sure in the time of reviewing papers, I can't think of one specifically, but I've been reviewing papers for the Journal of Failure Analysis for several years. Not one comes to mind, but I'm sure there's been quite a few superalloy papers that I've looked at over the years that I'm sure were aviation related. I just can't think of one off the top of my head.
BY MS. RATHKE:
Q Okay. Let's turn within Exhibit 91 to your case list. Sorry. We're on publications.
Are the list of publications, presentations, and research papers in Exhibit 91, are those complete and current?
A Those are complete. I'm in the process of completing another paper for the SAE related to the metallurgy of bus bars and their -- electrical bus bars and their performance in fires.
Q Because I suspect we're going to get asked about this, can you please spell "bus bar"?
A Bus bar. B-U-S B-A-R. Two words, or one word if you like.

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Q Have you ever published or presented anything specific to aviation?
A No, not that I can think of. And it's not on my CV, so I would assume no.
Q All right. Turning ahead to Appendix C within Exhibit 91. This is your testimony list there?
A Yes.
Q All right. And it appears that -- well, let me just ask you straight up.
Have you set forth a full and complete list of the cases in which you've rendered deposition or trial testimony since July 17, 2013?
A Yes. There's only -- there's a deposition missing on here that I completed recently.
Q Okay. And what case is that in?
A It's not on the list. It was a case for Daimler Trucks.
Q And is Squire Patton Boggs involved in that matter?
A No. Squire Patton Boggs does the vehicle work, and other firms do the truck-related work.
Q Okay. And who are you representing?
A I'm working for Daimler Truck North America.
Q And do you happen to know where the case is

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pending?
A It's in the Los Angeles area.
Q And which law firm is representing Daimler Trucks?
A Nelson Mullins.
Q And which attorney? Do you know?
A I think the lead attorney is still Cosgrove.
Q And what product -- is it a Daimler Truck product?
A It's a Daimler Truck product, yes.
Q Okay. Can you identify for me within Appendix C of Exhibit 91 which of the cases listed involves aircraft, aviation, or aerospace issues?
A Bahamas Air Holdings versus Messier Dowty in 2013.
Q And what was the product? Is that the landing gear?
A That was the landing gear case.
Q And what was your role?
A I performed the failure analysis on the landing gear.
Q And specifically on what part?
A I honestly don't remember. It was a high-strength steel component in the landing

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gear that fractured during the landing.
Q Okay. What else?
A That would be it.
Q Have you been involved in any litigation matter previously that involved bolted joints, failure analysis of bolted joints in any product?
A Yes.
Q Tell me about that.
A Well, there's some on my testimony list.
Q Okay. Which ones?
A The Edward Tavinor trial inquest in New Zealand involved bolted joints.
Q And what was the product?
A That involved the drive shaft and a transmission from a Mitsubishi truck that was manufactured by Daimler. Also on here -- on my testimony list, Dale Kelley versus Discount Tire involved a fastener failure.
Q Was it a bolted joint failure specifically?
A Yeah, it was a bolted joint failure.
Q Okay. What else?
A Sloan Petroleum. Bennett versus Sloan Petroleum was a bolted joint case.
Q In what product?

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A The Motorcoach Industries case was also a bolted joint case. I can't remember. I think it was related to the -- going back a few years. Put an asterisk by that because I'm not going to commit to that's what it was. I don't remember for sure.
Q Okay. Anything else on the list contained in Exhibit 91?
A Deenik versus Anvil was involving a joint, but it was a different type of joint. It wasn't a bolted joint. It was a mechanical compression joint.
I think that's it on my testimony list.
Q Okay. And I trust you've had other matters in life that involved bolted joints; fair?
A Oh, yes, I've been retained by your firm to investigate bolted joint matters.
Q Okay. Have you done any other work, litigation or otherwise, involving the failure of a bolted joint in an aircraft application?
A I looked at some insurance related landing gear bolts on something last year. I think that's all I can think of off the top of my head.
Q And in the last five years, what percentage of

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your work relates to a Daimler product of some -- of any variety?
A It varies year to year. Right now, I think I have three active Daimler cases.
Q What percentage of your workload is that?
A Oh, right now, 10 percent maybe, if that.
Q Okay. Over the past five years, what would you say the percentage of your work relates to a Daimler product?
A Well, there was one year where we did -- we were involved in a massive Daimler project and it took up almost six months. So if you include that, maybe 25 percent.
Q Okay.
A More normally I would say it's on the order of, you know, 10 to 15 percent. It just depends.
Q Do you hold any FAA mechanics licenses?
A No.
Q Do you hold any FAA inspection authorizations?
A No.
Q Do you hold any aviation credentials or FAA licenses?
MR. MARIANI: Objection to the form. Vague.

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THE DEPONENT: Not that I'm aware of.
BY MS. RATHKE:
Q Have you ever received any specialized training as an aircraft mechanic?
A As an aircraft mechanic, no.
Q Have you ever personally operated an aircraft?
A Only on video games.
Q Have you ever personally performed maintenance on an aircraft engine?
A Maintenance, no.
Q Are you credentialed to legally maintain, repair, or inspect an aircraft engine?
A By the FAA, no.
Q Or any country's credentialing body.
A No.
Q Have you ever taken any training or educational courses in aviation accident reconstruction?
A No.
Q Have you ever taken any training or educational courses in aviation failure analysis?
MR. MARIANI: Objection to the form. Vague.
THE DEPONENT: I have not -- an aviation specific failure analysis course, no.

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BY MS. RATHKE:
Q Have you ever taken any training or educational courses in aviation safety?
A No.
Q Have you ever received any training from Pratt & Whitney?
A No.
Q Have you ever received any training from the FAA?
A No.
MR. MARIANI: Objection to the form.
BY MS. RATHKE:
Q Have you ever personally seen a Pratt & Whitney 530A engine?
A No.
Q Including --
A Only components.
Q Including in this case?
MR. MARIANI: Objection to the form. Vague.
THE DEPONENT: No.
BY MS. RATHKE:
Q And you say only components. Have you ever seen any components of a Pratt & Whitney 530A engine

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other than the diffuser bolts and nuts?
A I don't believe so.
Q Do you know what the procedure is for a bolt to become certified for aerospace use?
MR. MARIANI: Objection of the form. Vague.
THE DEPONENT: I guess I don't understand your question. I know there's a certification process. Are you talking about the FAA certification process or the manufacturer's certification process?
BY MS. RATHKE:
Q I guess in this country the FAA certification process. Do you know what that entails for the Pratt & Whitney bolts at issue in this case?
MR. MARIANI: Objection of the form.
THE DEPONENT: Are you referring to how Pratt & Whitney certifies the bolts or how they would be certified to go back into service?
BY MS. RATHKE:
Q The former.
A I'm not familiar with that process.
Q Do you consider yourself to be an aviation expert?

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MR. MARIANI: Objection of the form. Vague.
THE DEPONENT: I consider myself to be an expert in failure analysis.
BY MS. RATHKE:
Q But I take it you do not consider yourself to be specifically an aviation expert; fair?
MR. MARIANI: Objection of the form. Vague and argumentative.
THE DEPONENT: Well, I certainly wouldn't be performing an aircraft accident reconstruction or anything like that. But I'm more than comfortable consulting on engineering issues on aircraft that fall within my area of expertise.
BY MS. RATHKE:
Q Do you consider yourself to be an aircraft mechanic expert?
MR. MARIANI: Objection of the form. Vague.
THE DEPONENT: Specifically I don't consider myself to be an aircraft mechanic expert, but I consider myself to be an expert in mechanics in terms of general procedures related

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to maintenance of aircraft or any other piece of equipment.
BY MS. RATHKE:
Q Do you consider yourself to be an expert in aviation safety and failure analysis?
MR. MARIANI: Objection of the form. Vague.
THE DEPONENT: I don't consider myself to be an expert in aviation safety per se, but I would consider myself to be an expert in failure analysis of aviation components as it relates to my background, education, and experience.
BY MS. RATHKE:
Q Do you consider yourself to be an expert in the installation and torquing of aviation bolts?
MS. RATHKE: Richard, that's a word you're going to hear a lot. Torquing as in torque.
MR. MARIANI: Objection of the form.
You can answer.
THE DEPONENT: Yes.
BY MS. RATHKE:
Q Do you consider yourself to be an expert in aircraft maintenance procedures?
MR. MARIANI: Objection of the form.

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Vague.
THE DEPONENT: I'm not an A & P maintenance person, so, no, I guess specifically I'm not an expert in every maintenance procedure as it relates to aircraft maintenance. Specific areas of topics I would consider myself an expert in.
BY MS. RATHKE:
Q What is the purpose of the diffuser in an aircraft jet engine?
A The diffuser is the part of the intake system that distributes air into the combustion chamber of the engine.
Q And is the diffuser located in the cold section or the hot section of an aircraft engine?
A It is adjacent to the hot section.
Q Do you consider it to be located in the cold section?
MR. MARIANI: Objection.
You can answer again.
THE DEPONENT: I think technically it's related -- it's in the cold section, but it's adjacent to the hot section.
BY MS. RATHKE:
Q In fact, the diffuser is located in the cold

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section of an aviation engine, correct?
MR. MARIANI: Objection. Asked and answered.
You can answer again.
THE DEPONENT: I think that's what I just said.
BY MS. RATHKE:
Q All right. Do you agree that the 24 broken diffuser bolts found in Menard's three aircraft engines constitutes a safety issue?
MR. MARIANI: Objection of the form. Vague.
THE DEPONENT: I will defer that answer to another expert. Based on what I've seen where they end up, it could possibly be an issue, but that's not my area.
BY MS. RATHKE:
Q Sitting here today, do you have any reason to dispute that the 24 broken diffuser bolts found in Menard's three aircraft engines constitutes a safety issue?
MR. MARIANI: Objection. Asked and answered.
You can answer again.

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THE DEPONENT: I would defer to Mr. Cheyne.
BY MS. RATHKE:
Q So the answer to my question is sitting here today you have no reason to dispute what I just said?
MR. MARIANI: Objection. Third time.
THE DEPONENT: I don't have any --
MR. MARIANI: You can answer -- hold on. You can answer for a third time.
THE DEPONENT: I don't have an opinion.
BY MS. RATHKE:
Q Would you get on an aircraft if you knew that it had broken diffuser bolts? Would you fly in that aircraft?
MR. MARIANI: Objection. Incomplete hypothetical.
You can answer.
THE DEPONENT: Possibly.
BY MS. RATHKE:
Q Do you agree that if the diffuser is not solidly held in place by the diffuser bolts, the air coming from the engine compressor could extinguish the combustion flame causing loss of engine power?

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MR. MARIANI: Objection. Incomplete hypothetical.
You can answer.
THE DEPONENT: Can you repeat the question? I apologize. I couldn't hear all of it.
BY MS. RATHKE:
Q Yes.
Do you agree that if the diffuser is not solidly held in place by the diffuser bolts, the air coming from the engine compressor could extinguish the combustion flame causing loss of engine power?
A So under your question do you mean all the bolts are disconnected?
Q Let's start there. Yes.
A I can see that as being an issue because then the diffuser is no longer supported.
Q Do you agree that broken diffuser bolts that are loose in the engine compartment can damage other engine components?
MR. MARIANI: Objection. Incomplete hypothetical.
You can answer.
THE DEPONENT: I don't know the answer to

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that. I don't know the answer for that. However, I can tell you based on what we've seen in the data on this particular case, it does not appear that it has damaged any other engine components.
BY MS. RATHKE:
Q Are you aware that in this case, the broken diffuser bolts that came loose and were loose in the engine compartment did, in fact, damage the compression line of one of the aircrafts?
A I believe it put some dents into it. That's correct.
Q Do you agree that when multiple bolts are used to join components, that when one bolt fails, there is an increased stress on the remaining bolts?
MR. MARIANI: Objection. Incomplete hypothetical.
THE DEPONENT: I agree that load is shifted when a fracture of a bolt occurs to the remaining bolts.
BY MS. RATHKE:
Q And do you agree that the increased stress on the other bolts increases the likelihood that

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the other bolts will also fail?
A No, not necessarily.
Q In this application involving the diffuser in Menard's aircraft, do you agree that the increased stress on the other bolts that remain increases the likelihood that the other bolts will fail?
MR. MARIANI: Objection. Vague as to which engine you're talking about.
THE DEPONENT: Could you repeat that question again? I'm sorry. You tailed off at the end. I think it's my speaker phone. I apologize.
BY MS. RATHKE:
Q No. That's okay. You're doing fine.
Do you agree that in the diffusers at issue in this case when one bolt fails there's an increased stress on the remaining diffuser bolts?
MR. MARIANI: That was asked and answered.
THE DEPONENT: Yes. I answered that question already.
BY MS. RATHKE:
Q The question that I asked previously related to

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products generically. Right now I am asking specifically with regard to this product. So let me ask again.
Do you agree for this diffuser on these engines, do you agree that when one diffuser bolt fails, there's an increased stress on the remaining diffuser bolts?
MR. MARIANI: Objection. Vague as to which of the three engines you're speaking of.
You can answer.
THE DEPONENT: Yes. Generally speaking, if one bolt is not present, then you will see an increase in load on the remainder of the joint that will be compensated for by the remaining fasteners.
BY MS. RATHKE:
Q And do you agree that this increased stress on the remaining fasteners increases the likelihood that those remaining fasteners will fail?
MR. MARIANI: Same objection. Unclear.
THE DEPONENT: Well, you would expect the alternating stress to increase on those fasteners. And at that point the likelihood of fatigue, depending on the state of stress, may

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or may not increase the likelihood of those bolts failing.
BY MS. RATHKE:
Q How about if, in the instance where 10 out of the 22 diffuser bolts in one of the aircraft, if 10 diffuser bolts failed, do you agree that that would increase the likelihood of failure of the remaining diffuser bolts?
A I would expect that to be the case.
Q So then let me ask you this: Would you want to fly on an aircraft if you knew that 10 of its 22 diffuser bolts had broken?
MR. MARIANI: Objection to the form. Incomplete hypothetical.
You can answer.
THE DEPONENT: Most likely not.
BY MS. RATHKE:
Q Do you have kids?
A I'm sorry?
MR. MARIANI: He couldn't hear the question.
BY MS. RATHKE:
Q Do you have kids?
MR. MARIANI: I'm going to --

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THE DEPONENT: No, I don't have kids.
MR. MARIANI: I'm going to object to asking personal questions about the witness, unless you have some basis to proffer how that relates to his opinions about expertise in metallurgy.
BY MS. RATHKE:
Q Sure.
Would you want your parents to fly on an aircraft if you knew that 10 out of 22 of its diffuser bolts had failed?
MR. MARIANI: Objection. Incomplete hypothetical.
BY MS. RATHKE:
Q Let me complete the hypothetical.
In this scenario, you like your parents.
MR. MARIANI: I still have my objection.
BY MS. RATHKE:
Q Ray didn't like his parents. That's okay.
You have parents getting on that plane. Nobody wants their parents getting on that plane; fair to say, Mr. Jones?
A I would think at the point where you're -- nearly half the bolts -- if nearly half the bolts are fractured, that would probably not be

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a safe condition to fly.
Q I mean, how about six out of 22? How do you feel about that?
MR. MARIANI: Objection. Incomplete hypothetical.
THE DEPONENT: Probably the same way. If it was a couple, I might consider it, but I don't know. I don't have enough -- the reason I'm changing -- not changing, but hesitant in my answer is I don't have enough information to examine the joint in order to give you an exact answer as it relates to that from a safety factor point of view. But that being said, I think that if you're near half of the bolts fractured, that the joint is going to be fairly heavily compromised and it's probably not a safe condition.
I also would say that according to the FAA, I guess based on what I've read, is that if any of the bolts are fractured, the aircraft would be considered out of service. So I would have to go along with that and say it's probably, as far as the FAA is concerned, it's not a safe condition.

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So at that point, I would say, no, I wouldn't let my parents on the plane.
BY MS. RATHKE:
Q Okay. So just to speak colloquially for a second. I mean, what happened in this case with the broken diffuser bolts, one engine which had 10 broken diffuser bolts -- I mean, this is legitimately a big deal and a cause for concern for Menard's; fair to say?
MR. MARIANI: Objection. Vague. And also compound.
You can answer.
THE DEPONENT: I'm sorry. Your question is having broken diffuser bolts is a concern for Menard's?
BY MS. RATHKE:
Q Yes.
A Yes. If I was Menard's, I would be concerned about it.
Q Okay. Fair enough.
And if it happened to you, your interest would be in figuring out why that happened; fair to say?
A That's correct.

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Q And you agree that wanting to know why that happened is a reasonable response in these circumstances?
MR. MARIANI: Objection. Vague.
You can answer, if you understand the question.
THE DEPONENT: Well, as an engineer and a failure analysis analyst, any time anything fractures or breaks, I'm interested in the reason why.
BY MS. RATHKE:
Q Do you agree that Menard's did not do anything to cause or contribute to any of the diffuser bolt failures in this case?
A Based on my analysis, yes. But I would defer the full answer to that question to Mr. Cheyne, who has done more investigation into the operation side of the engines.
Q Do you understand Mr. Cheyne to be saying that Menard's did anything to cause or contribute to the failure of any of these bolts?
A I haven't seen any opinions of his related to that yet -- pardon me. To the contrary.
Q I'm sorry. I think we got like a quadruple

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negative at this point. So let me just ask a straight-on one.
Are you aware of any opinions set forth by Mr. Cheyne indicating that Menard's did, in some way, cause or contribute to the broken diffuser bolts?
A No.
Q And I take it you've reviewed Mr. Cheyne's report; yes?
A Yes.
Q When was the last time that you spoke with Mr. Cheyne?
A A few months ago.
Q Do you agree that overtorquing diffuser bolts, if you did that, that could cause them to break in operation? Setting aside whether that is what happened in this instance.
MR. MARIANI: Objection. Incomplete hypothetical.
THE DEPONENT: Do I agree that overtorquing diffuser bolts could result in a fracture?
BY MS. RATHKE:
Q Yes.
A Are you going to narrow the question down to the

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location of the fracture or anything else?
Q No.
MR. MARIANI: Same objection.
THE DEPONENT: I agree that overtorquing the bolts to the point of cracking would result in fracture.
BY MS. RATHKE:
Q Do you agree that -- is it possible to overtorque the bolts, not to the point of cracking during the installation process but overtorquing them short of cracking caused the bolts to fail in operation?
MR. MARIANI: Objection. I'm going to object. There's two questions pending. So it's not clear to me if you withdrew the first question or you're asking two at the same time.
MS. RATHKE: I think I asked one question.
MR. MARIANI: Then I never heard the answer to the first. So can the reporter please read back the last two questions and tell me if there's any answer to the first one.
(Record read.)
MR. MARIANI: You can answer if you understand what the pending question is.

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THE DEPONENT: Could you just re-ask it again so I'm clear?
BY MS. RATHKE:
Q Yes.
Do you agree that overtorquing the bolts, but not to the point of cracking them during the installation, doing that is capable of causing the bolts to fail in operation?
MR. MARIANI: Objection. Incomplete hypothetical.
THE DEPONENT: How overtorqued are you talking about?
BY MS. RATHKE:
Q Let's say -- in this case, the proper torque range is 27 to 30 inch-pounds, right?
A Yes.
Q And in this case, I think you found that the cracking starts at, like, 180 inch-pounds, correct?
A In that range.
Q Okay. Let's say 100 inch-pounds.
A 100 inch-pounds is below yield.
No. I would say that is unlikely that that would cause a failure.

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Q What about 160?
A 160 is slightly over yield. If all the bolts were torqued in that range, I wouldn't expect there to be a failure.
Q You would not or would?
A Pardon me?
I would think that it's unlikely that you're going to see a failure if they're torqued in the yield range like that.
Q My question, though: Is that capable of causing a failure?
A I'm sorry. I thought someone was jumping in.
If there are no cracks in the bolts, no cracks initiated in the bolts, I don't believe that there would be a failure related to it.
Q In any instance?
MR. MARIANI: Objection. Asked and answered.
You can answer again.
THE DEPONENT: In any instance? I mean, you're increasing the mean stress on the bolt by doing that; however, we don't know the level of the alternating stress. But based on literature and analysis of a bolted joint, the answer would

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be typically no.
BY MS. RATHKE:
Q Okay. So if I'm understanding your expert opinion correctly, it is your belief that overtorquing bolts -- that overtorquing the diffuser bolts in this application will not cause them to fracture so long as they are not cracked during the torquing process; is that a fair statement?
MR. MARIANI: Objection. Misstates his testimony.
You can answer.
THE DEPONENT: I would add to that as long as there's no significant thread deformation that -- yes.
BY MS. RATHKE:
Q And in that case, I mean, do you agree or do you not agree that there's any particular importance to following Pratt & Whitney's recommendations -- sorry. Strike that.
Do you believe that it is not important to follow Pratt & Whitney's instruction that the diffuser bolts be torqued to the specified 27 to 30 inch-pounds so long as they're not cracked

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during the process?
MR. MARIANI: Objection.
THE DEPONENT: No. I don't agree with that. I think that the best method would be to apply it to their torque requirements. That's why they -- they did the analysis of the joint. They know more about it than Menard's or DAI, but based on evidence and based on literature and analysis of what we have, it suggests that there's quite a bit of leeway.
BY MS. RATHKE:
Q Okay. But from a practical perspective, in your expert opinion, it doesn't really matter if you follow Pratt & Whitney's instructions, just so long as you don't torque the bolt to the point of developing a crack. There should be no risk of failure.
MR. MARIANI: Objection. Asked and answered.
You can answer again.
THE DEPONENT: Well, yes. Basically, yes, because what we're seeing, if you overtorque a bolt, you get initiation of a crack in a completely different location. And because of

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that, the forces that are involved on the aircraft that are causing it to fracture at the threads are unrelated to that.
BY MS. RATHKE:
Q Do you agree that one of the main causes of threaded fastener failure is incorrect tightening?
A Yes, I agree with that statement. And the main cause of failure is insufficient tightening, not too much tightening.
Q And what supports that statement? What's the basis for your belief?
A Every literature, every bolted joint literature out there. My anecdotal experience in the real world.
Q Give me an example of a publication literature that supports the notion that undertorquing is the principal cause of threaded fastener failure.
A Introduction to Bolted Joints, the Handbook of Bolted Joints. I think there's a reference to it in the ASM handbooks. If you go through my literature file, you'll find any number of those references. I'd happily look them up for you.

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It's well established that undertorquing, or insufficient preload, moreover, is the primary cause of bolted fasteners.

If you read the literature -- if you read the literature, you'll see that most literature wants the most preload, i.e., the most torque you can possibly get on a bolt, as close to yield as reasonable. Or even in many cases, bolts are torqued to past yield in order to create a more uniform joint.

THE DEPONENT: Can we take a quick break?

MS. RATHKE: Of course.

THE DEPONENT: Okay. About five minutes.

MS. RATHKE: Yeah. Of course.

THE DEPONENT: Thank you.

Are you done with that question?

MS. RATHKE: Yeah. No. Go ahead.

THE DEPONENT: Okay. Thank you.

(Break.)

BY MS. RATHKE:

Q All right. So, Mr. Jones, I didn't have time to read your entire literature file over the break, but let's see.

Are you familiar with an article that you

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produced written by some -- called Investigation on Nickel-Based Superalloy Steam Turbine Bolts Fractured at High Temperatures: A Case History. First author is somebody named Rolla, R-O-L-L-A.

A Probably the Italian paper, yes. Do you have it handy or can I grab it?

Q Holdup. I got it for you.

I'm going to mark it. Okay. I don't know if you have to refresh, but if you do, on your screen, you should see the Rolla article which has been marked as Exhibit 92 to your deposition. And tell me if you --

(Exhibit No. 92 marked.)

MR. MARIANI: This is Ray. It didn't come up on mine.

MS. RATHKE: I'm sorry, Mr. Mariani. What did you say?

THE DEPONENT: I'm just grabbing my hard copy.

MR. MARIANI: This is Ray. It was not on mine. I'm now trying to refresh and go back in.

Okay. Now I think it's there. Let me see. Rolla article. Okay. I'm with you.

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BY MS. RATHKE:

Q Okay. Marked as Exhibit 92 to your deposition. Are you with me so far, Mr. Jones?

A Yes.

Q All right. So if you turn to -- I see that there are no page numbers, but if you turn to the second-to-last page of article text that has Figure 7 on it.

A Figure 7.

Q Within Exhibit 92.

A Yes. That's the micrograph showing the external chrome layer?

Q Yes. I mentioned that just to orient you as to page number.

Okay. Do you see a Section 4 on that page of Exhibit 92 headed "Discussions and Conclusions"?

A Yes.

Q Okay. About halfway down that paragraph, there's a sentence that starts "For each bolt material."

A About halfway down?

MR. MARIANI: It's close to the right margin.

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THE DEPONENT: Yes, I got it.

BY MS. RATHKE:

Q Okay. Let me just read what I want into the record.

So Exhibit 92 states: "For each bolt material, the failure rate has been determined as the ratio between the number of fractured bolts over the number of used ones, and the main fracture causes have been reported. Refractaloy 26 -- that's R-E-F-R-A-C-T-A-L-O-Y -- 26 confirms to be a good choice for high-temperature resistance bolts since its failure rate is only 0.03 percent. 15 fractured samples over about 50,000 bolts present in the investigation."

All right. Now it says: "The main identified cause of fracture is the incorrect tightening that produces higher strengths than the designed ones, and thus the consequent induced rupture."

Do you see that?

A Yes, I do.

Q I take that to understand that Mr. Rolla, et al. are saying that overtorque is the prevalent

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failure rate in this instance.
Do you agree with me?
A Yes and no. You're looking at this and looking at the wrong cause of failure here. They're talking about creep failures, which are not fatigue failures. And I would agree that overtorquing a bolt in a creep situation could potentially lead to a failure. It's not the same as a fatigue situation. It's unrelated.
Q Is overtorquing a bolt capable of causing a fatigue failure?
MR. MARIANI: Objection of the form. Incomplete hypothetical. I think it was also asked and answered already.
You can answer.
THE DEPONENT: In most cases overtorquing a bolt will not result in a fatigue failure.
BY MS. RATHKE:
Q The question was a little different, though.
Is overtorquing a bolt capable of causing a fatigue failure?
MR. MARIANI: Same objection.
You can answer.
THE DEPONENT: In some instances, it's

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possible. I don't believe it's possible in this particular joint.
BY MS. RATHKE:
Q In what instances is it possible for an overtorque to cause a fatigue failure?
A In a concentrically loaded joint.
Q And what does that mean?
A That means a joint that does not have any bending or prying forces on it, essentially.
Q Are there any other circumstances in which overtorque is capable of causing a fatigue failure?
MR. MARIANI: Objection. Incomplete hypothetical.
You can answer.
THE DEPONENT: Well, I already discussed -- so I discussed the cracking issue as well. I think I talked about that one. So I would say that we covered the two primary issues where you're going to see overtorquing result in a crack or a fatigue failure.
BY MS. RATHKE:
Q Are there any others?
MR. MARIANI: Objection. Asked and

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answered.
You can answer.
THE DEPONENT: Not that I think of right now.
BY MS. RATHKE:
Q Okay. How much have you billed on this matter to date?
A I don't know.
Q Approximately?
A I don't know. I would have to look at my invoices.
Q Did you produce invoices in your file?
A Yes.
Q Do you issue those monthly?
A Yes.
Q And did you produce all the invoices that you have sent to date on this matter?
A Yes.
Q What did you do to prepare for your deposition today?
A I --
MR. MARIANI: Hold on. I direct the witness not to answer with any of your communications with me, other than the

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communications where I directed you specifically to assume a certain fact as applicable to the case. Other than that, I'm directing you not to disclose any communications.
You can now answer.
THE DEPONENT: I prepared for this by reviewing my report, reviewing depositions, and reviewing my literature file and examining my data.
BY MS. RATHKE:
Q Did you review any new materials not previously produced to us in preparation for your deposition today?
A I think you've been supplied everything that I've reviewed, or at least a cover of the book from what I've reviewed.
Q Did you review any new materials that you hadn't seen before you wrote your expert report marked as Exhibit 91 in preparation for your deposition?
A Yeah, I did, actually. I think Mr. Mariani produced it to you. There was an NTSB article and some measurements and some photographs from Dallas Airmotive that I received.

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Q Anything else?
A I would have to double-check. Can you give me one moment?
Q Yes.
A Yes. There was one other article. Actually, it was previously produced by Mr. Meyers. Another article from the bolt science website. Actually, I didn't review it previously, but it wasn't part of my file.
Q And did any of the new materials that you reviewed that you just described to me, did any of those have significance with regard to the expert opinion that you've rendered in this case?
MR. MARIANI: Objection to the form.
You can answer.
THE DEPONENT: The NTSB article supports my opinion that the vast majority of bolt -- fatigue bolt fractures are related to undertorque or improper preload. The other thing that I provided just was related to breakaway torques and things of that nature. But, no, everything confirmed my opinions.
\\\

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BY MS. RATHKE:
Q And you mentioned measurements and photographs. What were those?
A The bolt testing that I performed, as well as the failure of the SEM work and optical work performed by ESI and Fusion.
Q Okay. And how long did you spend preparing for your deposition?
A I don't know. Maybe 12 hours. There's a lot of material.
Q Did you talk to any Dallas Airmotive mechanics about their training?
A No, I don't believe so. I may have.
Q Sorry.
A No. I apologize. I'm doing it to you.
I may have. There may have been one on the call that I was on, but I don't recall.
Q Okay. Tell me all of the Dallas Airmotive employees that you can recall speaking with.
A I spoke to Ian Cheyne, John Fallor, and I think I spoke to the general counsel once.
Q Okay. I would characterize the people that you've mentioned as management-level employees at Dallas Airmotive.

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Would you agree with that?
MR. MARIANI: Objection of the form.
You can answer.
THE DEPONENT: Yes. I do believe there was a mechanic in the room on one of my phone calls, but I don't recall that person's name.
BY MS. RATHKE:
Q Okay. Have you ever spoken to anybody at Dallas Airmotive who actually engages in the process of overhauling Pratt & Whitney 530A engines?
MR. MARIANI: Objection of the form.
You can answer.
THE DEPONENT: John Fallor is directly involved with PW530A.
BY MS. RATHKE:
Q Well, in no occasion does John Fallor's stamp appear on any overhaul document as him having ever completed an overhaul operation; fair to say?
MR. MARIANI: Objection. Argumentative.
THE DEPONENT: I don't recall seeing his name on any stamps.
BY MS. RATHKE:
Q And it's not consistent with your understanding

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of Mr. Fallor's role and responsibility at Dallas Airmotives that he would be personally doing the overhaul work for Pratt & Whitney 530A engines; fair to say?
MR. MARIANI: Objection to the form. Vague.
THE DEPONENT: I don't know what Mr. Fallor does.
BY MS. RATHKE:
Q Have you talked to any Dallas Airmotive employee about their process for overhauling 530A engines and specifically for overhauling the parts related to and adjacent to the diffuser?
A I've spoken to them related to parts outside of the diffuser. Is that the short form of your question?
Q No. The process of overhauling the diffuser and the diffuser bolts.
A I've spoken to them generally about it, both Mr. Cheyne and Mr. Fallor.
Q And what did they tell you?
A They confirmed the general procedure, what parts are replaced. They confirmed the inspection procedures and things of that nature.

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Q And what else have you spoken with Dallas Airmotive employees about?
A I can't remember if I spoke to them or I communicated it through Mr. Mariani, my request for bolts, exemplar bolts.
Q Is that where you got your exemplar bolts?
A Exemplar bolts from used engines were provided to me by Dallas Airmotive, and Dallas Airmotive also provided me 13 new bolts.
Q What else? Is there anything else that you spoke with Dallas Airmotive employees about?
A One thing that I recall is discussing the design of the 530A diffuser as it compares to the 540 and 545 engine.
Q Okay. What did you learn from that discussion?
A Well, significantly to me, and significantly to the fatigue issue is that the diffusers from the other engine are made out of a different material, which has a higher Young's modulus, which will affect the joint stiffness. And the subject diffusers, the 530A diffusers, are made from titanium, which has half of the Young's modulus or half of the inherent material stiffness of the steel-type diffuser of housings

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that are used on the 540 and 545 engines.
And as that's important to me is because that tells me right off the bat, because the geometry of those joints are relatively the same, they're within, I think a hundred-thousandths of an inch of each other, that the PW530A joint stiffness is going to be on the order of half of what you see on the other engines, which makes sense why we're only seeing failures on the 530A engine, because the joints are compressible and the stiffness of the joint is directly related to the Young's modulus of the materials.
Q Did you include discussion of this issue in your expert report?
A No, because I just got the information finally the other day. I think I did actually mention that the -- yeah, actually I did. I take that back. I think I mentioned some of it. I may have added a little more detail to it, but I do believe I mentioned it. Yeah, I did mention it in my report, and Mr. Cheyne mentions it in his report as well.
Q Well, you indicated the titanium issue in

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connection with the overhaul -- the final assembly installation procedures in heating; fair to say?
A I did indicate that, that's correct.
MR. MARIANI: Objection to form.
BY MS. RATHKE:
Q But not with regard to the comparison between the 530A and the 545; fair to say? That's not in the report?
MR. MARIANI: I'm just going to direct the witness, you have an 80- or 90-page report, and you can take all the time you wish right now to review the report in order to answer that question.
THE DEPONENT: I'm doing that right now.
BY MS. RATHKE:
Q Sure. Although, I mean, I think we both read it recently.
A Yep. I did mention it in my report, on page 49 of 65. I actually said the exact same thing that I just said to you. First full paragraph on page 49 of 65.
Q On page 49?
A 49 of the PDF. Page 48 of my report, 49 of the

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PDF, first full paragraph. Fusion Engineering notes that special instruction only applies, in the middle of the paragraph.
"These engines reportedly utilize diffuser housings manufactured from a steel alloy. This is significant because the modulus of elasticity (E) or Young's modulus, of titanium is much lower than iron-based alloys. In fact, it's approximately half. Consequently, the joint stiffness of the PW530A titanium diffuser duct will be lower than the engines with nickel- or iron-based diffuser housings."
Q Okay. All right. I want to go earlier in the report.
Page 2 of the report, it's probably page 3 of the PDF.
A One moment. This is one in which I wish I had two machines.
Q Actually it's page 1 of the report, which is page 2 of the PDF.
Yeah, I do think it's just easier to do this if you have two machines going at once, for future reference.
A Yeah. Okay. Page 2, page 1 of the report.

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Q Yeah. Exactly.
A Okay.
Q All right. I'm on the second-to-last paragraph, "According to."
A Yes.
Q Okay. You say: "According to the authorized release certificates, Dallas Airmotive followed Revision 30 of the 30J1113 Pratt & Whitney Overhaul Manual, June 4, 2010, and task 72-09-10-220-801 of the Pratt & Whitney Component Inspection/Repair manual when overhauling the 2006 Cessna engines in 2011. Dallas Airmotive used Revision 31 of the overhaul manual again in combination with the same task number of the component inspection/repair manual when overhauling the 2003 Cessna engines in 2013."
Okay. Other than viewing the authorized release certificates, did you do any other investigation to verify this specific point?
A No. I defer that to Mr. Cheyne.
Q And the authorized released certificates that you viewed, they do not specifically indicate that Dallas Airmotive complied with the Pratt &

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Whitney specified torque values for the diffuser bolts; fair statement?
A I don't think so, because they're saying they followed the Pratt & Whitney overhaul manual, which means they followed everything in the manual.
Q Okay. All right. And page 4 of the report, probably the fifth page of the PDF referring to Exhibit 91.
A Yes.
Q You refer to the Dallas Airmotive operation checklist. Do you see that, the paragraph above the graphic?
A At least two different -- are you on page 5 of the report? I'm sorry.
Q 4 of the report, 5 of the PDF.
No, it's not you. It's just cumbersome.
A No problem.
Yeah, you're looking at the page with Figure 2 on it, correct?
Q That's right.
A Okay. And your question was?
Q In the paragraph above that, you refer to the Dallas Airmotive operation checklist.

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Do you see that?
A Yes.
Q And you indicate that the Dallas Airmotive operation checklist specifically verifies that "the mechanic applied compound PWC06-009 to the threads of the 22 bolts, torqued the bolts in a star pattern, and retorqued the bolts at room temperature."
Do you see that?
A Yes.
Q Okay. Now that operation checklist, that is not a document that exists in this case with regard to each of the engines, correct?
In other words, there's an operations checklist for the 544 and the 545 engines but not for the 687 engine. Is that your understanding as well?
A Are we missing -- I know -- I think we're missing one, but I can't remember which. It must be the 687, according to my report.
Q Yes. Okay. So fair to say that you did not see an operation checklist for the 687 engine, correct?
A If it's in my report --

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MR. MARIANI: I'm going to object to the extent I believe the 687 engine, Menard has withdrawn any claims with respect to that engine, if I am not mistaken. One of the four engines they've withdrawn the claims.
MS. RATHKE: This is wrong.
BY MS. RATHKE:
Q Okay. In fact, you notice that there are virtually no overhaul records that exist for let's just say one of the engines at issue in this case, correct?
MR. MARIANI: Objection. Vague.
THE DEPONENT: I don't remember off the top of my head. I would have to go review it all again, but for some reason I think you're correct, but I don't remember 100 percent.
BY MS. RATHKE:
Q Did you ask anyone at Dallas Airmotive about why there were not maintenance records relating to one of the three engines at issue?
A I don't recall.
Q Do you recall anyone from Dallas Airmotive telling you that they had essentially lost or destroyed the records relating to that engine?

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A No.
Q Do you recall anybody from Dallas Airmotive offering any explanation as to where the missing records were?
A If they did, I don't recall.
Q In coming to your expert opinions in this case, is it helpful to have full maintenance records for each of the engines and components that you're giving opinions on?
A It's always helpful, yes.
Q Are you aware that Dallas Airmotive does have overhaul records for the 686 engine, which is the twin of the engine where the records are missing?
MR. MARIANI: Objection to the form.
THE DEPONENT: I'm aware that there's records for 686.
BY MS. RATHKE:
Q And do you know any explanation for why Dallas Airmotive would have disposed of records for one engine in an aircraft but kept records for the other one?
MR. MARIANI: Read back the question, please.

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(Record read.)
MR. MARIANI: Thank you.
Objection. Calls for speculation.
You can answer.
THE DEPONENT: I don't know.
BY MS. RATHKE:
Q Okay. Going back to your reference to the Dallas Airmotive operation checklist on page 4 of your report, Exhibit 91, fair to say that no Dallas Airmotive operation checklist for final assembly in this case directs the engine mechanic to verify that they've retorqued the diffuser bolts to the specified 27 to 30 inch-pounds, correct?
A Are you referring to the number being on the checklist itself?
Q I am.
A I agree with you, the torque number is not written on the checklist.
Q Do you have any understanding as to why it isn't?
A My understanding from what I've read and been told is that there's computer monitors at every workstation that provide that information to the

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mechanics as they do their work.
Q And where do you read that?
A I read it in Mr. Cheyne's report, and I believe the same was communicated to me.
Q By whom?
A Mr. Cheyne or Mr. Fallor.
MS. RATHKE: I'm going to direct your attention to what's been marked as Exhibit 93 on the screen.
(Exhibit No. 93 marked.)
BY MS. RATHKE:
Q And after you've had a chance to take a look, can you verify for me that Exhibit 3 (sic) is a final assembly checklist dated June 10, 2011, for one of the Menard's PW530 aircraft engines?
A Yes, it appears to be.
Are you referring to the first page?
Q Well, it's approximately a 20-page long document. So the checklist goes on at some length.
A Correct.
Q That's your understanding as well?
A Yes. And I believe your question is, does this pertain to one of the engines?

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Q Yes. Do you agree with me that it pertains to one of the engines, yes.
A Yes. I don't know specifically without cross-referencing the overall number, but, yes.
Q Okay. Where would you find the overhaul number? Is it on this document?
A The overhaul number is on the sales order, overhaul 53067.
Q All right. And is it your understanding that if tasked or an item is included in the Pratt & Whitney computer instructions, it would not be included on the overhaul manual -- sorry, on the Dallas Airmotive checklist including the one on Exhibit 93?
MR. MARIANI: Objection. Vague.
You can answer.
THE DEPONENT: I'm sorry. I don't understand your question.
BY MS. RATHKE:
Q What is your understanding of what dictates whether a task is included in the Dallas Airmotive checklist, such as the one marked as Exhibit 93?
MR. MARIANI: I'm going to object that this

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goes beyond the scope of the opinions proffered by the witness in the case.
But you can answer.
THE DEPONENT: I was just going to say, you would have to talk to Mr. Cheyne about that or Mr. Fallor.
BY MS. RATHKE:
Q Well, I think you were just telling me what they were telling you about it. So I guess that's what I'm asking.
A I'm sorry, then, can you repeat your question? It didn't make much sense to me.
Q Yeah. What dictates which items are included in the Dallas Airmotive checklist?
MR. MARIANI: Objection. Goes beyond the scope of what the witness has been proffered to testify about.
You can answer.
THE DEPONENT: I don't know. I didn't have -- I never asked that specific question. I don't see torque values written on here for anything. What I see looking at this document is the verification measurements and things of that nature that need to be recorded on there,

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but I don't see torque requirements for anything, which would suggest to me they're all on the computer monitor for them.
BY MS. RATHKE:
Q Well, if you turn to -- the Bates page is 2710 on the bottom, but it also happens to be task 83. So if you could get there with me, that would be great.
A Yes.
Q Task 83 instructs the mechanic to record a torque value; fair to say?
A "Install torque retaining nut."
Yes, I do.
Q So, I mean, it's not the case that Dallas Airmotive doesn't have its mechanics record torque values on its checklist. It has mechanics record torque values sometimes; fair?
A Yes. That's a very large torque. It looks like it says 2,250. I don't know what that retaining nut is but it must be a big nut.
Q And I take it you have no information as to why, in some instances, Dallas Airmotive's checklist require the mechanics to indicate a torque value and in other instances they do not?

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A No, I don't. I mean, to me this looks pretty similar to automotive engine and diesel engines checklist that work kind of the same way. But, no, I don't know the answer to your question.
Q Within Exhibit 93, let's go to task No. 101.
In task No. 101, Dallas Airmotive mechanics are again asked to record a torque value, correct?
A Yes.
Q So your understanding that torque values categorically do not get recorded on Dallas Airmotive's operations checklists, that is an incorrect understanding; fair to say?
MR. MARIANI: Objection. Misstates his testimony.
You can answer.
THE DEPONENT: Yeah. That's correct.
What I had said was I don't see them calling out specific torques on this checklist but you may have misunderstood me. There's only one or two instances where torques are called out on this entire checklist.
BY MS. RATHKE:
Q Let's start at --

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A As far as No. 101 is concerned -- sorry.
MR. MARIANI: Finish your answer, please.
THE DEPONENT: As far as 101 is concerned, make sure the key washer did not turn during torquing of the nut at 22 degrees.
I'd have to refer to the manual on that because I find it very odd that they're requiring the degree measurement and a torque, so there must be some specific specification that they're trying to meet for No. 101. But without reviewing that section of the manual, I couldn't answer that question more specifically than that.
BY MS. RATHKE:
Q Let's go to task No. 107 within Exhibit 93.
Task 107 in Exhibit 93 asks the Dallas Airmotive engine mechanic to verify minimum breakaway torque of 2.0 pound-inches between each shank nut and bolt.
So this is an instance where the Dallas Airmotive's instructions are directing a specified torque value; fair to say?
A What it's doing is verifying that the shank nuts are appropriate for replacement, or for use,

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correct.
Q Through a specified torque value, correct?
A Yes. But I don't think you understand -- perhaps you do, but what they're saying is it's a test. They're not installing anything to 2 inch-pounds; they're verifying that the breakaway torque of each bolt is at least 2. It's not an installation torque.
Q Does that matter?
A Yeah.
MR. MARIANI: Objection. Vague.
You can answer if you understand the question.
THE DEPONENT: It's not the same thing.
BY MS. RATHKE:
Q But is the distinction relevant? Is it material?
MR. MARIANI: Objection. Vague.
You can answer.
THE DEPONENT: It's noteworthy, but it doesn't have anything to do with the cause of failure of these bolts as far as I'm concerned.
BY MS. RATHKE:
Q I mean, the truth is you don't know anything

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about why Dallas Airmotive includes some tasks and not others in its operations checklist; fair to say?
MR. MARIANI: Objection. Asked and answered three times. You're badgering the witness on this point. I'll allow the witness to answer it yet again, a fourth time.
You can answer a fourth time.
THE DEPONENT: As I said, I've given you the knowledge that I have as it relates to this document.
BY MS. RATHKE:
Q Task No. 30 in Exhibit 93, it indicates that the Dallas Airmotive mechanic is to apply the compound PTWC06-009 to the threads and install the 22 bolts.
Do you see that?
A Yes.
Q The instruction to apply the compound to the threads of the bolts but not any other part of the bolts, like the underside of the head of the bolts, do you know what the purpose is of that instruction?
MR. MARIANI: Objection to the form.

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You can answer.
THE DEPONENT: I'm sorry. I don't understand your question. I think it speaks for itself. But I'm not sure I understand your question.
BY MS. RATHKE:
Q Do you have an understanding as to why the Dallas Airmotive instruction tells mechanics to apply the compound to the threads of the bolt only and not the underside of the head of the bolt? What's the purpose for that?
MR. MARIANI: Objection of the form.
THE DEPONENT: I'm sorry. Go ahead if you have an objection.
MR. MARIANI: I stated it. You can go.
THE DEPONENT: Typically you don't apply any sort of lubricant -- you typically don't want to apply a lubricant under the head of a bolt, mostly because it can cause loosening. You're relying on that friction in a lot of cases. So you typically wouldn't apply a lubricant under the head of a bolt.
BY MS. RATHKE:
Q And you know that in operation, there is

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typically not lubricant applied under the head of the bolt; fair to say?
A No. I've had cases -- in cases I've been involved in where people put have put lubricant on places where they haven't supposed to, and they resulted in failures, or loosening failures.
Q But you're not supposed to? These Dallas Airmotive components are not supposed to have lubricant applied to the underside of the head of the bolt; fair?
A Yeah. You would definitely try to avoid it.
Q Well, is it your belief that Dallas Airmotive's engineers have done that in this case? Because if so, I think we probably need to know that right now.
A I don't believe I've seen --
MR. MARIANI: Objection. Calls for speculation.
You can answer.
BY MS. RATHKE:
Q It seems to be suggesting that your mechanics have been doing that. I mean, have they been or have they not been?

MR. MARIANI: Objection. Compound.
You can answer if you understand what question is pending.
THE DEPONENT: I'm sorry. I didn't catch that last part. I caught like two words, "mechanics" and that was it.
BY MS. RATHKE:
Q Is it your belief that Dallas Airmotive's mechanics are applying lubricant to the underside of these diffuser bolts before they reinstall them after overhaul?
A I don't have that belief. I have seen no evidence to suggest that.
Q So on a test condition that does apply lubricant to the underside of a bolt, one of these diffuser bolts, does that replicate real-world conditions, correct?
MR. MARIANI: Objection. Can I have the question, Reporter?
Please read back the question, Rich.
(Record read.)
MR. MARIANI: Thank you.
You can answer.
THE DEPONENT: I think I already answered

the question.
(Record read.)
THE DEPONENT: Okay. Well, my answer would be that other than maybe a little bit of transfer that may have come from the thread as it goes through the hole, I wouldn't expect there to be a significant amount of lubricant under the head. Of course, when you lubricate the bolts and put them through the hole, you may get a little bit of material, a little bit of lubricant that ends up at the head area, but I wouldn't expect that to be applied there.
BY MS. RATHKE:
Q And so if you're conducting a test of these diffuser bolts in which you want to replicate real-world conditions, then you also don't want to apply lubricant under the head of the bolt; is that fair?
A I wouldn't intentionally apply lubricant there.
Q Your report again -- so now we're back to 91. Page 5 of the report, so probably page 6 of the PDF, Section 5.0.
Let me know when you're there.
A I'm there.

Q Okay. The middle of that paragraph indicates: "Calibration reports produced by Dallas Airmotive indicate that the workstation where the diffuser was assembled at Dallas Airmotive had torque wrenches in the ranges of 0 to 3 inch-pounds (sic), 0 to 50 inch-pounds, 0 to 75 inch-pounds, and 10 to 50 inch-pounds that were calibrated every four months."
Do you see that?
A Yes.
MR. MARIANI: Excuse me. I think you misspoke or I couldn't hear it at the beginning, but you first, I thought, said 0 to 3, when, in fact, the document says 0 to 30.
MS. RATHKE: Yeah, Ray. I think you're skipping out a little bit. So I think it may be a user issue on your part, but I agree with your reading of it.
MR. MARIANI: Okay.
BY MS. RATHKE:
Q My question for you, Mr. Jones, is, were there any records that you saw as to which of these torque wrenches was used for each part of the final assembly operation?

Actually let me scratch that question and let me instead ask: Did you see any records as to which of these torque wrenches were used to reapply the diffuser bolts after overhaul?
A No, I have not seen that record, but any of them would be appropriate. Moreover, 0 to 50 or 0 to 75 would probably be the most appropriate, or the 10 to 50.
Q Then why are those the most appropriate?
A The 0 to 30 could be used. I prefer to use a torque wrench when I'm doing a measurement of something like that, to use something closer to where my obtained value is more in the middle of the range of the tool, but if the 0 to 30 calibrates out at 30 inch-pounds to 30 inch-pounds, it's appropriate. It can be used.
Q Okay. Is it fair to say that the broader -- the range of a torque wrench is, let's say, 0 to 30 versus 0 to 75, for instance, the less precise its measurements are?
A I wouldn't say necessarily less precise. Depending on the accuracy and precision of the torque wrench, it would be more important to me,

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and then the precision. But I would have to look at those documents to see that.
Q Do you know what kind of torque wrenches were used for the replacement of diffuser bolts at Dallas Airmotive?
A I don't recall if they were on the Bates-numbered documents or not. I can't recall. I would have to refer to them.
Q Did you see any of the instrumentation that Dallas Airmotive used to reapply the diffuser bolts after overhaul?
A Did I personally see it?
Q Yes.
A No.
Q Okay. It is physically possible to tighten diffuser bolts using a regular ratchet wrench, correct?
A Yes.
Q And it is physically possible to tighten diffuser bolts by hand?
A You mean without a wrench?
MR. MARIANI: Objection to the form.
BY MS. RATHKE:
Q It could be done.

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A Without a wrench?
Q Yes.
A No.
Q And why not?
A Because if you don't have a wrench, the prevailing torque of the nut is about 9 inch-pounds. It's kind of difficult to apply 9 inch-pounds of torque to a No. 10 bolt by hand, especially on the diffuser housing.
Q Did you personally write every word in your expert report, Exhibit 91?
A No, probably not.
Q Who else contributed to the writing of the words in your expert report?
A Nicole Schimpf.
Q Could you spell her name.
A Schimpf, S-C-H-I-M-P-F.
Q Okay. And did you say another individual's name?
A Kevin Jones probably contributed as well.
Q Kevin Jones spelled like anybody would guess?
A Yep.
Q Any relation to you?
A He's my younger brother. He's another

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metallurgist.
Q And anybody else contribute to the language set forth in Exhibit 91?
A No. Primarily it was myself and then the remainder -- you know, parts in editing done by those two people.
Q Okay. Was editing done by any other people?
A In terms of the report composition?
Q Yes, please.
A People that it's gone through internal review, but no other people wrote anything.
Q Okay. So what was Ms. Schimpf's contribution to Exhibit 91?
A Nicole wrote some of the introduction areas, and she also went and probably did a fair bit of correcting my writing.
Q Anything else?
A She helped write some of the factual parts of the report.
Q Factual, like the beginning sections which we've already discussed?
A Yes. And also I think she put together -- I'm sorry. It's been a few months, but I think she put together kind of the summary of the testing

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and things like that. I don't think I wrote all of that.
Q Did she assist with any of the testing itself?
A Yes. She was involved in the testing.
Q What did Ms. Schimpf do with regard to your testing?
A It's kind of a two-man job. So herself or Kevin Jones would be assisting when we're putting the -- when we were running the testing that would be, you know, photography, helping with measurements, holding things still while we're trying to tighten bolts and things of that nature.
Q And was there any of the testing or investigative work in your report that you would say that Ms. Schimpf led rather than you?
A Led? No, I don't think so.
She may have led the research.
Q I'm sorry. Say that again. I didn't mean to cut you off.
A Oh, she probably led some research that I've asked her to do. For instance, she led our NTSB research. I assigned her to complete our spreadsheet with our data analysis in it.

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Q And what do you mean by the NTSB research? What does that specifically refer to?
A Mr. Meyers had produced a ton of NTSB citings talking about bolt torque, and I was interested to see what those were because, as I told you previously, that the vast, overwhelming majority of bolt fatigue failures are due to insufficient preload. So I had Nicole go through those documents one by one and determine if any of them were related to overtorquing.
Q And what did you determine?
A As I recall, I don't think there were any instances that were overtorquing. There may have been one, but I don't -- I'm not sure. I would have to look. If you like, I can consult my data and let you know.
Q Up to you after this but not at this time. But thank you for offering.
A Some of the NTSB research that was performed is the vast majority were due to undertorque or insufficient preload.
Q Okay. Seems to me like you can't swing a dead cat in this case without running into the Bickford book. Is that something that

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Ms. Schimpf located for you?
A No. I think everybody in my company has a copy of Bickford.
Q What other research did Ms. Schimpf perform in this matter?
A I believe she summarized Mr. Meyers' deposition.
Q Have you produced that summary in this case?
A Yes.
Q Did you, yourself, read Mr. Meyers' deposition transcript?
A Yes. I read every word of it.
Q And the same with Mr. Baron, B-A-R-O-N?
A Yes, I read Rick's report as well.
Q And his deposition transcript?
A Yes. His deposition transcript I read as well.
Q Okay. How about Kevin Jones, your brother, what was his role in the creation of Exhibit 91?
A Let's see. One moment. Let me just kind of go through it and I can give you a better idea.
Q Okay.
A Kevin did some photography work. Kevin also did some -- help assembling exhibits or figures for the report. Kevin also did some literature searching on the metallurgical side, not on the

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bolted joint side.
Kevin found some of the references that we used. Kevin assisted with some of the bolt testing in the beginning.
Kevin also actually, I think Kevin found and got Exhibit -- or Figure 35 in my report for me. Because I couldn't find it, which is just a chart showing the relative stress level for the number of teeth in a nut.
Q Is there any testing that your brother led rather than you?
A No. All testing was done at my direction. I mean, Kevin did on January 20th and when Mr. Meyers was here with his bolt, Kevin ran the microscopes and things of that nature, but the work was performed at my direction.
Q And how long have you worked with your brother?
A Well, Kevin is a partner in my firm. I've worked with him since 2006, approximately.
Q And is that just at Fusion or is that before Fusion as well? I apologize. I don't recall.
A We're going back to that parents thing a long time ago. My parents wanted to have me help my brother get out of the steel mill. So I helped

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Kevin get retained and hired by Packer Engineering many years ago, and I've worked with him ever since.
Q And is he an engineer like yourself?
A Kevin has a master's degree in materials engineering.
Q All right. And did anybody else assist in the creation of Exhibit 91?
A Possibly my assistant.
Q Okay. All right. In Exhibit 91 in various places, you indicate that during flight, the diffuser bolts are subjected to elevated temperatures and vibrations.
Tell me what you mean by that.
A Well, because the diffuser sits next to the hot section, it was communicated to me that it experiences temperatures in the range of 600 to 700 degrees Fahrenheit. And because it's a jet engine and it's subject to rotating components, there's all kinds of frequencies of vibration that are going to be exposed to it and those vibrations are going to be lateral, radial, and longitudinal.
Q And by sitting next to the hot section, do you

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mean in the cold section?
A Yes. It's in the cold section of the engine, but it butts up to the hot section.
Q And where do you get the information that the operating temperatures are around 600 degrees Fahrenheit? Where does that come from?
A I received that information from Mr. Cheyne.
Q And how did he convey that information to you?
A Actually, I recall him -- I think he looked it up based on the numbers, N1 and N2 section numbers, if I'm not mistaken. But you would have to ask him for sure.
Q Okay. Do you have an indication of how often or how -- for what duration of time the diffuser bolts at issue in this case are subjected to those temperatures, meaning in the 600 degree Fahrenheit range.
A No, not exactly, but gauging the oxidation layers that's growing, I would say they're up there probably for most of the time the engine is operating.
Q Okay.
A So I don't know. Defer those questions to Mr. Cheyne.

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Q Well, you said your conclusion is also based on the amount of oxidation you're seeing. So tell me how that contributes to your understanding that the diffuser bolts are subject to 600 degree Fahrenheit temperatures most of the time during operation. What do you mean by that?
A Because if they weren't exposed to any temperature, say over 3- or 400 degrees for any period of time, I wouldn't expect any surface oxidation to form on the bolts. So obviously they're getting up to a temperature where oxidation -- when I'm referring to oxidation, I'm talking about normal oxidation that you would expect to see in service.
So that implies to me the fact that you're seeing oxide layers develop would tell me that it's seeing temperatures above 4-, 500 degrees Fahrenheit.
Q And you're telling me that you saw oxidation developing on diffuser bolts that are at issue in this case. In other words, coming from Menard's engines, correct?
A Well, that's apparent. If you look at the

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bolts, obviously they've changed colors. The reason they've changed colors is due to oxidation.
Q And are we talking about the bolts received in your custody that were broken during operation?
A Are we talking about the subject bolts?
Q Right. I think we're in final agreement with each other. But I just want to make sure that you mean the bolts that you received that are the broken bolts and not any of the ones that went through testing, were cleaned, or whatever, that were still installed in the engines that you may have gotten from Mr. Meyer?
A I'm sorry. I'm completely confused. I don't know what you mean. I didn't receive any bolts from Mr. Meyer.
Q Well, you got some bolts from Mr. Meyer that he did some testing on; fair?
MR. MARIANI: Objection of the form.
You can answer.
THE DEPONENT: I didn't have any bolts from Mr. Meyers. I photographed one from Mr. Meyers, and I measured some of the subject bolts.
\\\

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BY MS. RATHKE:
Q Okay. So the oxidation -- the bolts that you saw that experienced oxidation, those would have included the bolts that broke in Menard's engines; fair?
A How about I sum it up this way? Every bolt that I've seen removed from an engine has some degree of oxidation on it, what I would call normal surface oxidation.
Q Did you personally see a bolt from Menard's engines that was removed from the diffuser that hadn't broken that had surface oxidation?
A Yes.
Q How many such bolts did you have?
A I don't have any of them.
Q Well, then, what do you mean that you saw them? Where did you see them?
A How many did I see? Well, I can show you every single one.
Q Okay. Which ones?
A Every one.
Q And which ones are those?
A I would have to look them up. Every one that was removed from the engine.

Q And came into your custody?
MR. MARIANI: Objection. Misstates his testimony.
Go ahead.
THE DEPONENT: What I'm telling you quite simply is the bolts that were in service on the subject engines all experienced some degree of surface oxidation.
BY MS. RATHKE:
Q Did you personally observe any of the bolts that came out of Menard's diffusers that were not broken?
A Yes.
Q Which ones?
MR. MARIANI: Objection. Hold on a second. Objection to the form.
Let me just note for the witness. If you want to refer to your report at any time, unless you're directed not to refer to it, you can feel free to refer to your report at any time.
BY MS. RATHKE:
Q You can refer to the Holy Bible for all I care. I just want to know what bolts you looked at.
A The ones that were removed in December 2019.

Q And which ones are they? I mean, you give them numbers, correct? Which ones?
A Give me a minute. I'll give you every number.
Okay. From 687: 2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 14, 15, 16, 19.
From 545: 11, 13, 20, 21, 22.
From 544: 1, 2, 3, 5, 6, 7, 10, 12, 13, 22.
MS. RATHKE: Mr. Court Reporter, were you able to follow that?
COURT REPORTER: Yes, ma'am.
BY MS. RATHKE:
Q And you're saying -- did you have those bolts in your custody?
MR. MARIANI: Objection to the form as to "custody."
You can answer if you understand what the question is.
THE DEPONENT: They were brought to my office by Mr. Meyers and Mr. Baron, and I examined and measured them at that time.
BY MS. RATHKE:
Q For what duration of time did you do that?
A I don't know. A few hours.

Q Okay. Explain what you mean by normal surface oxidation, the phrase you used a few moments ago.
A Normal surface oxidation is the -- because these bolts operate at temperature -- these bolts are designed to operate at a lot higher temperature. But what happens over time is you get selective depletion of elements at the surface layers, and it occurs during normal operation at temperature. It's expected.
Q And are you able to quantify the magnitude and duration of the vibrations that these diffuser bolts are exposed to in service?
A Unfortunately, no. That would require strain gauging and putting accelerometers onto a working engine and doing a significant amount of testing, unless Pratt & Whitney would've been kind enough to give us that information.
Q Did you ask?
A Yes.
Q Tell me about how you asked for that information.
A I just asked Mr. Mariani if that was possible.
Q And was it?

A I don't think he was able -- I don't know if he asked for it or not. You would have to take it up with him. He said he would look into it.
Q Okay. And have you ever communicated with anybody at Pratt & Whitney about any aspect of this case?
A No, not at Pratt & Whitney.
Q And I take it that knowing about the operating conditions and being able to quantify the operating conditions to which these bolts were exposed, that would help the analysis of trying to figure out what happened to them and what caused them to break?
MR. MARIANI: Objection. Vague.
THE DEPONENT: I think that we have enough information right now to come to a good engineering conclusion. More information would be noteworthy, but I don't think it would change any opinions at this point.
BY MS. RATHKE:
Q Your report, Exhibit 91, is dated February 21, 2020. When did you perform the testing described in Exhibit 91?
A What testing in particular? There's a lot of

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testing in here.
Q Let me just short circuit this.
Is it fair to say that you conducted the sum and substance of the testing set forth in Exhibit 21 -- in Exhibit 91 -- before February 21, 2020 when the exhibit is dated and was produced but after receiving Menard's expert reports on December 20, 2019? Between those two periods of time.
A Yes. That would be a fair statement.
Q Okay. Did you do any investigation or testing that did not make its way and is not mentioned in Exhibit 91?
A No.
Q Did you ever investigate -- I'm going to ask you a couple things. I'm going to ask you whether you investigated them. Okay?
Did you ever investigate the possibility that the bolt failures in this case were caused by differential thermal expansion of the joint, particularly with respect to the fact that the diffuser block was made from titanium?
A Yes. To the extent that I could, yes, I did.
Q And what did that investigation consist of?

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A Well, I think we've already talked about it earlier today. We looked at the fact that it's made out of titanium. We talked about the fact that its stiffness is half that of steel and how that would affect the stiffness of the joint.
I really became interested in that a lot because Mr. Meyers testified to something that's just physically incorrect. He said the joint was incompressible and that the incompressible joint had no bearing on the torque or anything like that related to the bolt, which is just factually and physically false from a number of records.
So when he brought that up, I decided to investigate that. And interestingly, because of the fact that the modulus of titanium is very low compared to that of steel or stainless steel, the joint stiffness is going to be greatly affected. And I suspect that strongly that has a lot to do by -- you see failures on the 530A engines up and you don't see them on other engines.
Q Did you investigate the possibility that galvanic corrosion caused the bolt failures in

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this case?
A Yes.
Q And what was the conclusion of that inquiry?
A We didn't see evidence of galvanic corrosion.
Q Did you investigate the possibility that harmonic vibrational modes exacerbated the cracking of the bolts?
MR. MARIANI: I couldn't hear the question. Please read it back.
BY MS. RATHKE:
Q Did you investigate the possibility that harmonic vibrational modes exacerbated the contracting cracking of the bolts?
A Well, yes. And that goes right back to the use of titanium, because the titanium is going to change the natural frequency of the diffuser and it's going to lower the natural frequency of the system right there. And by lowering the natural frequency of the system, it's going to be more susceptible to resonant frequencies. So yes, I did investigate that.
Q And did you investigate the possibility that a manufacturing defect caused the bolt failures?
A Yes, I did.

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Q What was your conclusion?
A I think it's contributory in this particular case.
Q Page 6 of your report, Exhibit 91, so page 7 of the PDF.
A I have it.
Q Specifically referring to Figure 3.
Do you observe -- so what's being depicted in Figure 3 is each of the broken diffuser bolts that you had access to; fair to say?
A Those were the bolts that were provided to us at the inspection in August of 2019 at ESI in Dallas.
Q Okay. And is it your observation that each of the nuts installed is installed very near the end of the bolts, within the last one to two bolt threads?
A Yes.
Q And do you have an understanding as to why they do it that way?
A I don't understand your question.
Q Sure.
A Why they put the bolt all the way through the nut?

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Q Do you have an understanding as to --
A One moment. My lights just went out. Sorry.
Q Do you have an understanding as to why the standard placement of the nut is within one or two threads of the end of the bolt? Why is that the installation point?
A Is your question why one or two threads stick out the end of the nut?
Q Yes.
A Is that it?
Well, No. 1, you want to have the bolt run all the way through the nut so you get full thread engagement. And then you typically want to go at least one thread below the end of the bolt so you're out of the run end area of the thread. So a proper joint or proper assembly would use a bolt that penetrates completely through the nut.
Q And is it the case that where a nut sits on the bolt in service affects the forces that the bolt is exposed to?
A I don't understand that question. I'm sorry.
Q Sure.
So let's say that you had the nut engaged

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much further up on the bolt so you had lots of bolt sticking out the end of the nut. Do you understand me so far?
A Yes. Lots of threads sticking through the nut, correct.
Q That's right. Yeah.
In that instance, would it be fair to say that, functionally speaking, you are using a much shorter bolt than the full length of what that bolt would be? If you're able to decipher what I'm saying.
MR. MARIANI: Objection of the form. You can answer.
THE DEPONENT: Well, the bolt wouldn't necessarily be shorter. It depends on the joint that it's being past through.
BY MS. RATHKE:
Q Sure. But the forces that are going to be acting on that bolt will be acting on the portion of the bolt that -- put it this way: The forces that are acting on that bolted joint will not be acting on the portion of the bolt that's sticking out past the nut, correct?
A Other than the elastic forces that are

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transmitted through the tip of the nut, I would tend -- I think -- I'll predicate it, I think I agree with you.
Q Okay. Let me think of a better and more coherent way to say this, because perfectly candidly, it's been a long time since I took a science class.
So let me say that -- is it fair to say that if a bolt -- if a nut is fastened further up on the bolt, the bolt will experience different physical forces than if the nut is fastened within the last threads or two the way that it's supposed to be?
A If I'm understanding your question correctly, no.
Q I'm trying to find a good way to communicate this.
A You can draw me a picture.
Q Can I, though? I mean, I don't know that I can. I mean -- all right. I'll try.
I'm a bolt. This is me.
A And when we're done here, can we take a quick lunch break?
Q Yeah.

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Okay. I'm a bolt. Do you see I'm a bolt here?
A Yes.
Q Okay. I'm a nut. Look at me, I'm a nut. This is me.
A Yeah.
Q Just nutting it up over here.
So this is Bolt No. 1. Now I'm going to draw Bolt No. 2 and Nut No. 2.
Okay. Bolt 1 versus Bolt 2. Do you see what I'm saying?
A Okay. So you have two different-sized joints essentially.
Q Well, I kind of meant to make them the same length.
A You wanted them to be the same length. Okay. So you're saying if I put a longer bolt through -- if I -- I'm trying to answer your question.
What you're saying is -- let me present a hypothetical.
Q Yes.
A If you have a one-inch piece and you put a bolt through it, and one bolt sticks out a little bit

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and another bolt sticks out a lot more, that's your question?
Q You're with me.
A The string development between the clamped surface is going to be the same.
Q The string development between the clamped surface is going to be the same. What does that mean?
A That means the stress and strain in the clamped area is going to be the same.
Q The stress and strain in the clamped area is going to be the same, but is the stress and strain between the bolt head and the clamped area, that will be different as between the two bolts because there's more length on one than the other, correct?
A No.
MR. MARIANI: Objection to the form. You can answer.
THE DEPONENT: No. The part sticking out the end of the nut doesn't have any effect, other than a mass effect.
BY MS. RATHKE:
Q Well, that's not true. If you've got a bolt,

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and you've got part of it that's sticking off the end, the part that's sticking off the end is absorbing and experiencing no relevant physical forces pertaining to that clamping force, correct?
A I agree with you.
Q All the force is being distributed on the part of the bolt that's within the nut or higher; fair?
A Or higher or you mean below the nut, if you will? Between the bolt head and the nut.
Q Yes.
A Those forces will be the same regardless of the length of the bolt.
Q The forces will be the same, but their distribution on the bolt area will be different because in the -- you have different lengths of bolt to absorb those forces as between the two scenarios, correct?
MR. MARIANI: Objection in the form.
THE DEPONENT: I disagree with that statement, if I understand you correctly.
BY MS. RATHKE:
Q The clamping forces, the forces acting on the

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clamped joints, are the same -- those forces don't care where you put your nut, right?
A They don't care where you put your nut.
Q So the net forces operating on your bolted joint are going to be the same no matter where you put your nut? The amount of force --
A I'm not trying to be difficult with you. I just don't understand.
Q Yeah, I don't believe that you are.
So the physical forces caused by the application will be the same across the two-bolt scenarios no matter where the nut is placed, correct?
A I guess -- when you say "where the nut is placed," because the nut -- if it's a joint, the nut can only be in one place, okay? So that's what I don't understand -- that's where I'm losing you. And I'm trying to understand what you're telling me.
The nut would be the same place. So because the nut is in the same place, if you look at this from a free-body diagram perspective, the forces are only going to be active between the clamped members. Okay?

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Q Yes.
A So unless the amount of threading and shank ratio is different within the bolt, there's not going to be really any difference.
Q I agree with you.
And the difference in these two scenarios, if the bolt has a lot of hang off past the nut versus whether it doesn't, is that the bolt with a lot of hang off, that hang-off portion will not be eligible to absorb the forces being experienced by that bolted joint; fair?
A Yes, I think I agree with you.
Q Okay. I think we got there. That's great.
MS. RATHKE: You had asked for a break. Let us commence with the breaking -- for lunch you said?
THE DEPONENT: Yeah. I just got to grab a sandwich or something.
MS. RATHKE: Sure. How long do you guys think?
THE DEPONENT: Whatever works for you.
MS. RATHKE: Ray, is 30 good?
MR. MARIANI: Yeah, for me 30 minutes is good. I don't know if Aaron has to go out for

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something or you have something accessible there.
THE DEPONENT: I'll tell you what, let me go see. They were supposed to bring me something. Let me go see. And if they haven't gotten it here yet, then we can keep going if it's good with you guys, until it shows up.
MS. RATHKE: Okay. Report back.
MR. MARIANI: We're just going to wait a second for you then.
MS. RATHKE: Yeah. We can go off while we're waiting, though.
MR. MARIANI: Go ahead.
(Off the record.)
BY MS. RATHKE:
Q Mr. Jones, do you have an opinion to a reasonable degree of scientific certainty as to what did cause these diffuser bolts to develop an initial fatigue crack that progressed into bolt failure?
A Yes.
Q Tell me what your belief is.
A My opinion is that, No. 1, it's related to reusing the bolts based upon our data. The data

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suggests that reusing the bolts changes the frictional characteristics of the bolts that will then result in a change in preload of the bolts.
Also, the data and my analysis suggests that there's a manufacturing defect in the bolts themselves. And both of those contributed to the initiation of the fatigue crack.
Q Let's start with contributing cause No. 1, reusing the bolts changes the frictional characteristics which changes the preload. Why does that happen? What causes that in your opinion?
A What causes the change in frictional characteristics?
Q When you reuse the bolts, yes.
A Well, I think the change in frictional characteristics -- actually, I want to throw in another factor but let me answer your question as well.
The change in friction is probably related to No. 1, the bolts have been used before so the threads are going to have a change in their surface, simply because the threads have been

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engaged in the past. And, secondly, that the oxidation that occurs on the bolts in service is going to change their frictional characteristics as well, and that's reflected in the literature that I provided.
Q And specifically what literature are you referring to in this moment?
A It's covered in both Shigley and Bickford, in both of Bickford's books.
Q And could you spell "Shigley"?
A S-H-I-G-L-E-Y.
Q Thank you.
All right. And now tell me about cause No. 2, the manufacturing defect issue.
A Okay. Well, if you refer to the PWC report that was published on DAO517, they made an interesting discovery. They found evidence of a high-temperature oxide layer that was developed during bolt manufacturing. Essentially it had to be developed during bolt manufacturing due to the temperature that the oxide they discovered formed.
That oxide was subsequently rolled into the threads when the thread was rolled following

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heat treatment. And that left a layer inside the bolt in the threaded area of the bolt that was then compressed into the area of the bolt that left a stress concentration in the bolt that would make it more likely for fatigue cracks to initiate.
We found the same evidence present on the subject bolts from the Menard engines.
Q On how many bolts from the Menard engines?
A The ones that we examined that were available to us.
Q So all of them, the ones that you listed for me earlier?
A No, I didn't find them on them. I found them on the metallographic examples that were examined.
Q Okay. And can you orient me in your report to where that metallographic examination is discussed?
A Well, there's a picture on -- I can show you some more. There's one in my report. There's several more that I can refer you to, but Figure 37 of my report, but I could show you some other ones as well, if you would like.
Q Are the other photographs that you're referring

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to, are those in your expert materials?
A They were provided by your experts.
Q Okay. So how many -- all right.
Is it your understanding or belief that this manufacturing defect occurs across all such bolts that have been manufactured, or it's an episodic manufacturing defect that occurs with some production runs?
A I can't answer that question. All I can tell you is the evidence that I've seen. I don't know. I mean, these bolts are most likely made in a batch manner, and I don't know how big the batches are, but I'll just note that the -- I apologize. I forgot what I was going to say.
I don't know what the manufacturing process is; however, I suspect the bolts are made in batches. I don't know how frequently those batches are made, but we did see evidence of a high-temperature oxide layer on the subject bolts, similar to the bolt from DAO517. And that bolt, as you recall, was not installed by Dallas Airmotive. It was installed by Pratt & Whitney. And the same issue was present on our bolts.

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Q Okay. And did you see evidence of this manufacturing defect on all SEM images for the subject bolts that you observed or were there images where you did not observe this manufacturing defect?
A It's only visible on the SEM images of the bolt cross-sections that are in high-enough suitable magnification to see it.
Q And were there any SEM cross-sections where you did not observe but you could expect to be able to where you did not observe the manufacturing defect?
A As I sit here I don't recall exactly, but I suspect -- I expect it's going to be visible on all of them.
Q Okay. And the Pratt & Whitney report that you refer to, is that the report that references the bird strike?
A No. It's the materials laboratory report.
The bird strike was DOA508.
Q And which report are you referring to?
A DOA517.
Q And the first issue that you discuss that reusing the bolts changes the frictional

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characteristic of those bolts making them more prone to failure, what percentage of the bolts would you expect -- strike that.
Given both of the factors that you explained to me -- strike that too.
You indicated that there was a third factor that you wanted to discuss as well but that you would answer my question first. So what's the third factor?
A Oh, yes. The third factor is that I can't omit or tell you the amount of what we would call in engineering terms accumulated damage to the bolts prior to them being removed and reinstalled by Dallas Airmotive.
In other words, because this is a high-cycle fatigue failure, the fatigue crack itself does not initiate until well -- well into the life of the failure. In other words, typically speaking, a high-cycle fatigue crack is only present in the last, I think, 10 percent, approximately, of the failure. And the remaining 90 percent of the time goes into initiation.
So I can't tell you that how much damage

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was accumulated by the bolts in prior operations.
Q Okay. So the first factor that you told me, reusing the bolts changes the frictional characteristics of the bolts which changes the preload makes them more susceptible to failure. In what percentage of the bolt -- the diffuser bolt population would you expect reusing the bolts to change the frictional characteristic of those bolts? Is it across the population or is it a subset?
A I would expect some change across the population. The range of that change I don't know.
Q So given -- all right.
So given that you would expect cause No. 1, the change to the frictional characteristics on the bolts on reuse, which you expect to occur to some degree across the population, and given the manufacturing defects which you observed 100 percent of the time when it was possible to observe it, what percentage of bolts would you expect to fail after they've been reused?
MR. MARIANI: Objection. Incomplete

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hypothetical.
You can answer.
THE DEPONENT: Well, that goes back to the load case scenario, and then you're getting into details related to the exact preload distribution on the joint and you're getting into issues related to the statistical ability to reproduce preload from one bolt to the next. So I couldn't give you an exact answer.
What I can tell you is that this -- the way these failures are occurring suggests to me that reusing the bolts, and potentially even some of the new bolts, because we've seen failures of brand-new bolts on engines as well, that it's probably what I would call right on the edge of design.
BY MS. RATHKE:
Q What does that mean?
A Meaning that it's in the statistically -- in the statistical area where you're going to get occasional failures even on new bolts, based on the evidence I've seen so far.
Q So I forget exactly what the numbers are, but fair to say that the majority of bolt failures

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have occurred on these three Menard's engines?
MR. MARIANI: Is there a question or are you asking him if he agrees with you?
BY MS. RATHKE:
Q Do you agree with me?
A The majority of the -- the bolt failures that we're aware of, I think the majority of them are -- the ones that we're aware of, I think the majority of them have occurred on Menard's engines.
Q Why is that?
A Well, if you look at the data, one thing I'll tell you is, No. 1, the Menard's engines were right at overhaul, at their overhaul or close to their overhaul requirements. Let me double-check my data here.
And they were also high-time engines, relatively speaking.
Q But we're certainly not alone in that; fair to say? There are, I don't know, a hundred such engines that have been overhauled, right?
MR. MARIANI: Did you get to complete your prior answer, Mr. Jones, when you said you were looking for data?

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THE DEPONENT: I'm sorry. I was looking something up.
MR. MARIANI: So can we let the witness please complete the prior answer before we move on?
THE DEPONENT: I'm trying to find it. One moment.
So I'm looking at this, and if you look at the failures that we're aware of right now, it seems that the Menard engines 544 and 545 have the largest number of hours on them, and they've also experienced the largest number of failures.
DAO687, for example, has 7,563 hours and has three bolt failures. Well, that's identical to DAO517 that experienced three bolt failures that have 7,200 hours. So I suspect what you're seeing is that statistical -- a statistical variation based on time.
BY MS. RATHKE:
Q So do you think that all engines that get to a point in overhaul use similar to the engines 544 and 545? If your theory is right, should they also be experiencing broken diffuser bolts?
A It's entirely possible. The other variable that

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you have to consider is -- the exact procedure and torquing procedure that would be applied. Okay.
So everyone follows the book, but does Dallas Airmotive wait three minutes between tightening the bolts and Pratt & Whitney wait 7? Those things, when you're getting down in the weeds of failures that are these low high-cycle fatigue failures, those are the things you have to start considering. So there could be small, small, you know, in -- well, what you would consider relatively inconsequential changes to the procedure or just following the procedure and doing it under a slightly different time frame because this case is heated up. That's all going to have an effect on the preload and you could be seeing some of that stack up going on right here.
Q Do you have a sense for how many PW530A engines are in the field in use today?
A No.
Q Sorry. Go ahead.
A I know it's over 700.
Q You're aware that that's an older engine,

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correct?
MR. MARIANI: Objection of the form.
THE DEPONENT: I think one set of engines was '03 and one set of engines was '06.
BY MS. RATHKE:
Q Okay. But is Pratt & Whitney making 530A engines anymore?
A I don't know.
Q Okay. Do you have any sense for -- of the population of 530A engines in the field, what their use history is going to be like? I mean, how old are these engines?
A I don't know. It seems like there's a big variance because I think DAO169, which is an earlier engine than any of the subject engines, it only had 4,000 hours on it in 2018 or 2019. So you're going to see a big variance.
Q I see. So is it your belief that the 544 and the 545 engines that Menard's owned, that these are the highest-use engines in the fleet of Pratt & Whitney 530A engines? Is that your understanding?
A No, I never said that.
Q Is it your understanding?

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A No. I just say of the population of the sample of engines that we have, those engines are on the -- the engines with the most failures are on the high end of ours.
Q Okay. But I guess what I'm asking about, is the population of other engines that exist in the world, which is greater than five, even considerably greater than five, how does our experience compared to -- I mean, as far as we know, there are no bolt failures in the hundreds of other engines that are in use. Do you agree with that?
A I'm not aware of any other failures at this point, other than the ones that have been discussed.
Q And you're aware that Dallas Airmotive is responsible for let's say 40 percent of the overhauls of Pratt & Whitney 530A engines, correct?
MR. MARIANI: Objection. Lack of foundation.
You can answer.
THE DEPONENT: I don't know the -- I don't know what percentage of overhauls that Dallas

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Airmotive performs.
BY MS. RATHKE:
Q Okay. Are you aware that Dallas Airmotive has performed -- are you aware that other than Pratt & Whitney, Dallas Airmotive is the only approved overhaul company for Pratt & Whitney 530A engines? Are you aware of that?
MR. MARIANI: Objection to the form.
You can answer.
THE DEPONENT: I'm aware of Dallas Airmotive and PW West Virginia, the two overhaul facilities. There could be more, but those are the ones that I'm aware of.
BY MS. RATHKE:
Q Well, I think you say it in your report that other than Pratt & Whitney, Dallas Airmotive is the only FAA approved overhaul shop for these engines, correct?
A I believe so.
Q Okay. So I get that you don't have a precise sense for how many 530A engine overhauls that Pratt & Whitney has performed, but certainly you know that the number exceeds 100, correct?
A According to Mr. Cheyne's report, Dallas

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Airmotive has completed 150 overhauls.
Q Okay. And so to be overhauled, the engines must have been in use for at least 4,000 flight hours; is that correct? Is that your understanding?
A Well, under a normal overhaul, yes. But if there's other reasons for it to come in to be overhauled, it may not be in the 4,000-hour interval.
Q Generally speaking, though, that's correct, 4,000 hours, right?
A Generally speaking, that's the overhaul interval.
Q Okay. So if we know that at least 100 530A engines have been overhauled by Dallas, not even by anybody else, why aren't we seeing broken diffuser bolts in the vast, vast majority of these engines, if your theory is right?
MR. MARIANI: Objection.
Sorry. Objection. Calls for speculation. Incomplete hypothetical.
You can answer.
MS. RATHKE: Well, I thought he was the expert.

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MR. MARIANI: I object to your comments on the side, which is uncalled for.
You may now answer the question.
THE DEPONENT: Could you repeat it? You kind of broke up at the end of your question.
BY MS. RATHKE:
Q Yes.
A I'm sorry.
Q Given that we know that Dallas Airmotive has itself touched more than 100 530A engines and overhauled them, so we know that there are at least that population of aircraft that have been in service long enough to be overhauled, why aren't any of those engines experiencing broken diffuser bolts if your theory is right? What's your explanation?
A Well, I disagree with that, say that, okay, Dallas Airmotive's performed 150, and right now they're aware of four engines that have had diffuser bolt failures.
Well, Pratt & Whitney -- I'm aware of three failures from Pratt & Whitney. So I would say it's fairly equal in terms of that.
Q Yeah, I'm not trying to distribute blame. I

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think you're looking at the wrong focus of my question.
I'm just asking why there aren't more broken diffuser bolts in the field, given that we know that Dallas Airmotive itself has overhauled 150 of these engines so they've been in use for more than 4,000 hours, we can presume. Why aren't we seeing more failures? Why is it just us?
A Like I said --
MR. MARIANI: Objection. Lack of foundation.
You can answer.
THE DEPONENT: Like I said, this is a high-cycle, very low-stress fatigue failure. You're getting -- the reason that I believe that you're not getting more, or at least at this point we don't know if there's more. I mean, I don't know how many have not been reported for that matter.
But the reason that I believe that it is this way is because this joint essentially is on the edge, and you're getting what I call statistical failures.

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BY MS. RATHKE:
Q Okay. And you know that --
A The preload could be related -- you know, the small changes in preload could be related to exactly, you know, air in the torque wrenches, okay. Temperature -- the exact temperature at which the torque is applied when it comes down at 400 degrees.
All those things are going to accumulate into an air band, a statistical band that is going to contribute to the failure rate. And if we're right on the edge, which I suspect we are, I think that's why you're seeing these failures, a very rare occurrence.
Q All right. You are aware that failures of diffuser bolts have to be reported to the FAA's database, correct?
MR. MARIANI: Objection. Calls for a legal conclusion.
You can answer.
BY MS. RATHKE:
Q I take it you're not aware of that?
MR. MARIANI: Objection.
THE DEPONENT: I've seen some people

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discuss it, and I'm not sure what the answer to that is so I would defer to Mr. Cheyne.
BY MS. RATHKE:
Q Is he a lawyer?
A No. The expert.
Q Okay. So you think that it's possible that they're not being reported. That's your testimony?
A I can't exclude that right now, no.
Q Okay. How many do you think --
A To that example, there's an engine out there that's got a broken diffuser bolt in it right now that we still don't know what happened to it. The CLBS engine that was a brand-new engine that had a diffuser bolt failure. I haven't seen anything on the FAA or anywhere else that suggests that that one has been investigated or reported.
Q Have you looked?
A Yes.
Q Where is your belief that these failures are reported to? What's your understanding of where that information goes?
A Well, I've looked on the NTSB, and I've looked

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on the FAA website, and that's about as much of the ability that I have to do. I know the Dallas Airmotive doesn't have any information about that engine either.
Q Okay. So your words are it's likely that many engines are right on the edge, correct? That was your testimony?
A Yes.
Q Right on the edge of what? Like, how many diffuser bolt failures do you feel like we're right on the edge of?
A What I'm saying is the joint is on the edge, and it's going to be extremely sensitive to preload. And all of these variables, once you stack them up, air in torque wrenches, temperature at which you complete the torquing, the speed of the torquing, the joint is sensitive to all of those things, so you're going to see -- in some cases you're going to get some that are maybe torqued right on the edge.
Let's say we had it torqued to 30 inch-pounds and the air of the wrench was a little bit -- the precision of the wrench is a little bit different. This could be DAI. This

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could be Pratt & Whitney. You're getting into that range where you're getting barely enough preload.
So now -- this is what I suspect, is you're getting into that range where there's just barely enough preload and any little thing, any little change, if the preload is just slightly too low, then you're going to start getting a fatigue crack. Nonetheless, I can tell you this, that there's no evidence that the bolts failed due to overtorquing, especially due to your expert's theories.
Q Well, if "any little thing" can mean that you're going to start getting a preload, I mean, listen. My client is just an aircraft owner. They don't have anything to do with this industry other than that. But why isn't Dallas Airmotive, therefore, sounding the alarm?
MR. MARIANI: I'm going to object to the question as compound and also including some gratuitous comments.
You can answer if you understand what the question is.
THE DEPONENT: I think the question is why

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didn't Pratt & Whitney do something about it? And as of May, they did.
BY MS. RATHKE:
Q So you're going to say the reason that -- you've known about this issue since at least the date of your report in February, correct?
A Correct.
Q By extension, Dallas Airmotive has understood this issue at least as of the date of your report in February, correct?
A Yes.
Q As of February, when we knew Dallas Airmotive knew, that any little thing could cause us to start getting a partial crack, since that time, has Dallas Airmotive started replacing diffuser bolts during overhaul or are they still reusing them? Have they been reusing them?
MR. MARIANI: Objection. You misstated his testimony.
You can answer.
THE DEPONENT: You did misstate my testimony. However, as far as I'm aware, Dallas Airmotive has been replacing the bolts for quite some period of time now. I don't know exactly,

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but I believe they've been replacing the bolts since prior to my report being issued.
BY MS. RATHKE:
Q What's the source of your information?
A Dallas Airmotive.
Q And is it your understanding that Dallas Airmotive has been contacting operators that they did overhaul for previously where the usage levels are getting higher to notify them of this issue?
MR. MARIANI: Objection. Calls for speculation.
You can answer.
THE DEPONENT: I don't know.
BY MS. RATHKE:
Q Should they be?
MR. MARIANI: Objection. Calls for a legal conclusion.
You can answer.
THE DEPONENT: I think that's a Pratt & Whitney issue. The manufacturer is in charge of those things.
BY MS. RATHKE:
Q Okay. But I think we know that Pratt & Whitney

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isn't doing it. At least they're not to my knowledge. Dallas Airmotive knows that this problem exists.

Should it -- and that it has contributed to the problem by performing overhauls and reusing bolts. Should -- under these circumstances, should Dallas Airmotive be notifying operators that they need to come in and get their diffuser bolts replaced?

MR. MARIANI: Objection. Same question that you just asked. Calls for a legal conclusion again, because it's the same question.

You can answer it a second time.

THE DEPONENT: No, I don't believe they need to because Pratt & Whitney issued a service bulletin in 2018 recommending the bolts to be replaced.

BY MS. RATHKE:

Q So you think that eliminates all danger from the field if, going forward in May, we start replacing bolts rather than reusing them? Any previous overhaul where we replace bolts, that's not an issue. We can just wait until the next

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overhaul.

MR. MARIANI: Objection. Incomplete hypothetical.

Answer if you understand the question.

THE DEPONENT: Like I said, I think the onus is on the manufacturer of the engine. Dallas Airmotive, as a remanufacturer or rebuilder, is obligated to follow the procedures put forth by Pratt & Whitney.

BY MS. RATHKE:

Q Is that a "just following orders" defense?

MR. MARIANI: Objection to the question. Vague.

You can answer if you understand.

THE DEPONENT: I think Dallas Airmotive acted appropriately. When they discovered the issue with broken bolts, they started replacing bolts and using new bolts in their process. I think that's entirely appropriate.

BY MS. RATHKE:

Q Okay. But Dallas Airmotive has overhauled engines in the field, correct?

A In the field?

Q Yeah. It's overhauled PW530A engines for its

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own customers, correct?

A Yes.

Q To your understanding, does Dallas Airmotive owe any duty at all to those customers of Dallas Airmotive to say, We have recently learned that we should not have reused some bolts that we put into your engine. We wanted to notify you of this problem because we believe it's a safety issue.

Do you think there's any obligation that Dallas Airmotive has to notify people that they have a safety issue?

MR. MARIANI: I'm going to object. It's the third time you asked this. You're asking for legal conclusions from a lay witness, and this also goes beyond the scope of what this witness --

MS. RATHKE: He's not a lay witness. He's your expert.

MR. MARIANI: This goes beyond the scope of what he's designated for as an expert. So you can ask him about his opinions in the area he's designated. He's not designated as an FAA expert on this case.

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MS. RATHKE: I'm not asking as a legal matter.

BY MS. RATHKE:

Q Do you feel that they have any moral obligations to go tell people in the flying public that are their own customers that, We've learned that it's unsafe to reuse diffuser bolts in your engines, which is a thing that we've done?

MR. MARIANI: I'm directing him not to answer. You can't ask the witness about what he thinks of, quote, moral obligations of parties in the case. That's not within the scope of his expertise. It's not what he's hired for. It's not what he's designated for.

You're -- basically you should keep your questions to what he's designated for. No differently than he's not designated about other issues related to this case. He's on specific issues.

MS. RATHKE: Ray, your speaking objections are inappropriate.

MR. MARIANI: Your questions -- you're abusing your right to question the witness. You can't ask him anything you want. That's not

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within Rule 26.
MS. RATHKE: Then you just object.
MR. MARIANI: No, no. I have other bases to go beyond it. I can direct him not to answer when you're abusing your rights as a lawyer.
MS. RATHKE: Then do that. But your speaking objections are inappropriate.
MR. MARIANI: Well, I thought you would want to know why I'm directing him not to answer a question.
MS. RATHKE: No. I believe that your speaking objections are inappropriate.
MR. MARIANI: Okay. Move on then, please. I directed him not to answer. If you have any more questions. If not, let the other person ask.
BY MS. RATHKE:
Q Would you get on a plane that had Pratt & Whitney 530A engines if you realized that it had been overhauled once in the last year and the bolts had not been replaced?
MR. MARIANI: Objection.
THE DEPONENT: Yes.
MR. MARIANI: Incomplete hypothetical.

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You can answer.
THE DEPONENT: Yes.
BY MS. RATHKE:
Q Why would you feel safe doing that, considering your testimony about the systematic issues with the diffuser bolts?
MR. MARIANI: Objection. Argumentative.
THE DEPONENT: I didn't say "systematic." I said "statistical." Statistically the odds of failure are very, very small.
BY MS. RATHKE:
Q How small? What are they?
A I don't know. Out of the universe of engines, we're aware of five so I think that's a pretty small margin.
Q You said there could be others out there.
A That's correct.
Q After how many hours of usage would you expect the initiation cracks to occur in the bolts?
A Well, according to your experts, they were there the minute -- the minute the bolt was installed.
Q That's not what my experts say.
A Yes, they do.
Q But is that your answer?

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A No, that's what your experts explicitly say. They say we overtorqued the bolts and we cracked them. Your experts explicitly say that.
Q Okay. I'm not asking you to testify for my experts. Do you understand that?
A I clearly understand it. I'm just saying you asked a question. I can't answer that question directly.
Q When would you expect initiation cracks to occur, after how many hours in service?
A I don't know.
Q Based on your theory?
MR. MARIANI: Objection. Incomplete hypothetical.
You can answer.
THE DEPONENT: I don't know.
BY MS. RATHKE:
Q Directionally speaking, approximately how many thousands of hours of service?
MR. MARIANI: Same objection.
THE DEPONENT: I don't know.
BY MS. RATHKE:
Q What percentage of the fleet of the population of diffuser bolts used in Pratt & Whitney 530A

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engines would you expect to fail under your theory?
A I don't know. I don't have enough information, and I don't have enough information about the joint to make that conclusion.
Q Is there any pattern as to which diffuser bolts are likely to fail first based, for instance, on their positioning around the circumference of the diffuser?
A I haven't investigated that directly, but I would refer to my notes, and I could maybe attempt to answer that, but I haven't looked at that directly.
What I do recall seeing is that it seems like one goes, and then as a typical flange failure, you see the adjacent bolt go and they tend to work in either adjacent bolts or on the other side.
Q So either adjacent or not adjacent?
A There could be on the other side, but typically you see -- typically, and I'm not saying that that's the case for every single bolt on one of these engines. I would have to consult my notes, but typically you'll see one and then the

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next one will go and it'll follow a pattern.
Q And is that because if you lose the joining force of one bolt, that puts more force on its neighbors?
A Yes. The load is shed to the neighboring bolts.
Q Yeah.
Okay. Referring back to Exhibit 91, which is your report. Let's go to page 15 of the report, page 16 of the PDF, Section 8.0.
A Okay.
Q In the middle of the first paragraph in Section 8.0, you say: "Dallas Airmotive provided data regarding the breakaway torque values measured when these bolts were removed from the diffuser assemblies."
Do you see that?
A Yes.
Q Do you have information as to how these breakaway torque values were measured by Dallas Airmotive before the components came to you?
A Yes. As I stated in my report, they measure them in a loosening direction.
Q Do you regard Dallas Airmotive's breakaway torque data as accurate?

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A Accurate for loosening direction, yes.
Q And you seem to emphasize "for a loosening direction." What do you mean by that?
A Well, I expect the numbers to be a little bit higher in the tightening direction.
Q And why is that?
A Because typically when you have a bolt in the tightening direction, there's some things that come into effect, frictional things that come into effect that affect things differently in the tightening direction as opposed to the loosening direction.
Q In your mind does that mean that measuring breakaway torque in a tightening direction is improper?
A No. I mean, typically measuring breakaway torque can be done either way. You'll see literature cite one way or another. I typically do it in the tightened direction, but a loosening direction is okay, too, for the purposes of what we're doing here.
Q And do you regard -- I think if you look at page 16 of your report, 17 of the PDF, table 1 sets forth the breakaway torque data for each of

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these five bolts in each of these five engines, correct?
A Correct.
Q How many bolts do you have per engine?
A For all of them but DAO169, I have all 22.
Q Okay. And how many do you have for 169?
A I don't recall -- I think I have them all, but I just don't recall off the top of my head.
Q Okay. And in your data file, is there raw data indicating what bolt had each breakaway torque value? In other words, if I wanted to know the breakaway torque value for each particular individual bolt, could I find that in your file?
A Yes.
Q Okay. And who did you receive that torque -- breakaway torque information from?
A The breakaway torque information was sent to me with the bolts from Dallas Airmotive.
Q And by whom specifically at Dallas Airmotive?
A I don't recall who sent -- whose name was on the envelope. It was Ian Cheyne or John Fallor, I assume.
Q And what is your understanding as to why the reinstalled bolts have higher breakaway torque

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values?
A Well, I think it's a couple things. No. 1, the bolts have been reused so the threads have, like I said -- I think I answered this question already, but I'll do it again. The bolts had been used once, okay, so the thread flanks have all been contacted by a nut in the past. There's oxidation on the bolts now that wasn't there the first time.
And your question was why did the new bolts -- I think that was the comparison between new bolts and old bolts. Yes, that's my answer.
Q But is it your understanding that the fact that the thread flanks had been contacted in the past, is it your understanding that that would tend to make the torque lower or that it would make it higher?
A Well, it changes the frictional characteristics of the bolt. So it's -- it could go either way, but what we're seeing is it makes it go higher.
Q And what's the mechanical explanation for that?
A That adhesion and sticking and friction between the bolts. It could be the formation of a fresh oxide layer -- a new oxide layer between the

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bolt and the nut. I can't tell you exactly what's going on. There's too many variables to consider.

But that's why people tell you -- that's why most joints that are considered critical, manufacturers tell you to replace the bolts because you avoid problems like this.

Q So if there are other applications within these aircraft or other aircraft where Dallas Airmotive is reusing rather than replacing bolts, is that problematic for you?

MR. MARIANI: Objection to the form. Vague.

You can answer.

THE DEPONENT: One moment.

The answer to that is it's not problematic to me as long as they're following what's dictated by the manufacturer.

Let me turn my lights back on. I apologize.

BY MS. RATHKE:

Q No problem.

A I don't know why I have to get up to make the lights turn back on.

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Q So you used the phrase, and it went by me so quickly I didn't write it down, but if something is a critical joint or critical --

A If you look at data, and I can tell you from anecdotal experience as well, if you look at literature, you know, engineering literature, you'll see that the recommendation is -- engineering recommendations are typically to replace bolts that are used in critical locations upon reassembly.

Q And what is a critical --

A Well, the definition of critical, it depends on what the manufacturer deems critical or not. Apparently, Pratt & Whitney now deems this critical because they're requesting replacement bolts now.

Q And have you had a conversation with anybody at Pratt & Whitney about that?

A No.

Q Okay. Let's go to page 17 of Exhibit 91, so Figure 15. Talk a little bit about your testing now.

All right. Figure 15 on page 17 of Exhibit 91 shows your test fixtures; fair?

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A Yes.

Q What organization calibrates these?

A They were -- calibrated what? The Mitutoyo micrometer?

Q Yes.

A It was calibrated by Mitutoyo.

Q And how often?

A It's brand-new.

Q As of when?

A As of five days before the testing began. The certificate of calibration is in my file. It's the same one Mr. Meyers used.

Q The same what?

A Same micrometer.

Q Okay. And in your eight test parameters, you test how much torque is needed in what conditions to stretch or break various bolts. Is that a fair characterization of what you're doing?

A What I'm doing is developing a torque displacement curve so I can calculate the friction factor or nut factor that goes into assembly. I'm also characterizing when cracks develop and where those cracks develop.

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Q And in doing this, is it your intention as closely as possible within the equipment that you've got to replicate as closely as possible?

A I apologize.

Q No, go ahead and turn on your lights.

A I'll do it in the dark.

Q Okay. Is it your intention in these micrometer testing -- in these micrometer tests to replicate as closely as possible the operating conditions of the diffuser bolts when they're being used?

A No, I'm not trying to replicate the operating conditions. I'm just trying to characterize the stretch in the bolts in a substantially similar joint.

And I am going to go turn my light on, if you don't mind.

Q I do not.

I'm looking for a particular picture. Well, just looking at your Figure 15 in Exhibit 81, does this depict -- do these pictures depict a fair and accurate fashion how your micrometer testing was conducted?

A I don't really understand the question. It's

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just showing -- the purpose of this photograph was just to show the two different fixtures. But, yes, it's generally showing how the measurements were taken on loaded bolts.
Q And how -- these also characterize fairly how the bolts were placed in the test equipment?
A How the bolt was fixtured in the test slug, yes.
Q Yes. Go to page 22 of Exhibit 91.
A Yes.
Q You see Figure 20?
A Sorry. 20. Figure 20? Yes.
Q Yeah, Figure 20.
A Yes.
Q The lower picture in Figure 20, there's a picture of a test L used bolt. Is that one of the bolts that you tested with the micrometer?
A Yes.
Q Okay. And --
A Obviously, I didn't measure it when it was broken because it bears no -- there is no valid number because it's broken, but that bolt was measured with a micrometer before it was tested.
Q And the way that the nut is placed on the test L used bolt depicted in Figure 20 in Exhibit 91,

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is this how the nut was placed when you were doing your stretch testing?
A I don't know what you mean.
Q Where the nut is sitting on the -- is where the nut is sitting on the bolt, is that where you had it when you were doing the test?
A Well, that's where the nut was relative to the bolt when it broke. That one was torqued up to 209 inch-pounds, so it threaded in a lot more. But generally speaking, yes.
Q And is that placement of the nut on the bolt, is that substantially similar to all of the testing that you did as described in Section 8.0 of your report marked as Exhibit 91?
A I'd direct you to my photographs of the testing that would show you where the nut was in every test.
Q Okay. And is it your belief that those photographs are in your report, Exhibit 91, or are they in your work file?
A They're in my file.
Q Okay. All right. Now, is it fair to say that if the placement of the nut on the bolt is as depicted in Figure 20, so let's say with five or

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six threads protruding off the end of it, as a functional matter you are testing the amount of stretch in the portion of the bolts that is between the nut and the bottom of the bolt head?
A Yes. I think -- yes.
Q And do any of your tests replicate what torque value is needed to produce a failure when a bolt is subject to engine heat and vibration as it is in operation?
A No.
Q And your testing shows the overtorque required to produce an instantaneous overload of a bolt by applying a torque that exceeds the strength of the bolt; is that correct?
MR. MARIANI: Objection to the form. You can answer.
THE DEPONENT: I don't agree with the term "instantaneous overload."
BY MS. RATHKE:
Q Is there a better term that I should be using? I think you see what I'm trying to convey.
MR. MARIANI: Objection of the form. You can answer if you understand the question.

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THE DEPONENT: Can you just repeat the question?
BY MS. RATHKE:
Q Yes.
What your testing shows is the amount of torque required to produce fractures in a bolt by applying a torque value that exceeds the strength of the bolt, correct?
A That's one of the things my testing shows. The most important thing that my testing shows is that by overtorquing a bolt, you will never get a crack between the first thread and the nut and the bolt. And that's the most significant result of my testing. The fracture location is secondary to the cracking location that my testing shows.
The main purpose of fracturing the bolts was just to get an idea of what it actually took to fracture the bolts. Like I say in my report, Mr. Meyers' data is grossly skewed because of the amount of friction he had under the head of the bolt that caused extremely high friction nut factors. So I wanted to find out what the true fracture torque would be approximately.

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Q Why is friction underneath the head of the bolt improper?
A Because if you read any book on bolted joints, it will tell you to avoid exactly the situation that exists on Mr. Meyers' bolt.
Q Why?
A Because it creates excess friction.
Q I think we read, though, in Dallas Airmotive's operating checklist that in operation you're not supposed to put any sort of lubricant underneath the head of the bolt. Do you recall that?
A That's unrelated to what I'm speaking of. But, yes, I do.
Q In actual operation, there will be friction underneath the bolts with whatever surface it is that the bolt is contacting, correct?
A There won't be that much.
Q Why not?
A There's no evidence of that same type of damage -- it's as simple as this. His test data is invalid because of the amount of friction that he generated under there, the torque value that he required to fracture.
If you look up the nut factor that we

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calculated, it's more than twice what is indicated in any reputable piece of literature. That tells you there's an issue right there.
Q For your testing, did you put a lubricant under the head of the bolt?
A Not intentionally ever.
Q Okay. But my question is: Did you put lubrication under the head of the bolt?
MR. MARIANI: Objection. Asked and answered.
You can answer.
THE DEPONENT: Unintentionally. Like I said, sometimes just in any assembly situation, you may get a small amount of lubricant under the head of the bolt due to the fact that you're putting it through the hole and a little bit may scrape off.
However, if you look at the bottom of my bolts, you'll see some evidence of some galling, which will suggest there wasn't really any lubricant present there.
BY MS. RATHKE:
Q So how did you avoid friction to the bottom of the bolt without intentionally applying

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lubricant?
A Well, that's really easy. I drilled the hole the right size. Mr. Meyers' clearance hole was undersized. I wasn't provided his fixture to measure it, but it's clear on his test fixture that there is galling in the radius and on the shank of the bolt. So that's telling me that the clearance hole in his test fixture was too small.
Q Do you indicate in your report that his clearance hole is too small?
A I think I do.
Q Why don't you go ahead and let me know -- orient me to where you indicate that.
A Right there on page 29 of my report, paragraph underneath Figure 23: "Fusion Engineering observed a significant amount of smearing and galling beneath the head. Figure 24 shows that the smearing extended into the radius between the flange and shank of the bolt, suggesting that interference was occurring between the radius and the bolt hole in the test fixture, indicating that a high friction was present."
Q Where does it say that the bolt hole was too

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small?
A Well, I'm saying the exact same thing with "interference." It's synonymous.
Q Does any of your testing show that a used bolt develops cracks at a lower torque value than the new bolt?
A I think they were all within the same range. I would have to double-check my data, but as I recall they were all relatively close to each other.
THE DEPONENT: Can we take a quick five-minute break? If you got a question, go ahead.
MS. RATHKE: No. We can take a break.
THE DEPONENT: I just want to see if I can fix my light real quick here.
MS. RATHKE: Sure. Let's go off.
(Off the record.)
BY MS. RATHKE:
Q Is it fair to conclude, based on what you just told me, that as far as how much torque it takes to actually crack a bolt, your testing shows that the performance of new bolts and the performance of used bolts is comparable?

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A As I said, that's my recollection. I would have to check my data to confirm that.
Q As far as bolt stretching is concerned, is time a factor at a given torque level for how much bolt stretch that will occur? In other words, like, having it torqued for a year, is that going to produce a different result in terms of stretch than doing it for a second?
A You're going to get a small amount of relaxation over time.
Q Is that quantified anywhere?
A I think it depends on a lot of factors, but it's going to be a small amount.
Q Page 19 of your report, Exhibit 91. The last paragraph says -- in the middle it says that you indicate that stretch deformation occurred predominantly to the -- in the shank portion of the bolts.
It's not clear to me how you determined that. So can you tell me how you determined that and the extent to which these figures on the next page are relevant?
A Are you referring to -- okay. Well, you have to look at the rest of my file. But what we did

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here was we developed -- we got the thread form from the SAE or ANSI standard. We found the limits of that thread form. We then scaled the thread form to the bolt itself to calculate how much deformation was occurring in the threads. And then for this particular test what we did was perform optical measurements of the shank and the threaded portion to get the change in length of each portion. It's in my file.
Q Okay. So let me just ask a few follow-up questions to make sure that I understand. So is it fair to say you compared a stretched bolt to the drawings set forth in the SAE standard first?
A Okay. Well, no. There's two different things. For the bolts that are discussed -- let me make sure I'm giving you the right information.
Okay. Yeah, so for this one what we did is we took the 19032 thread form, the UNJ form --
Q Which one is that? What is that?
A The 19032 thread form, which is the thread of this particular bolt.
Q Okay. Yes. I understand.
A What we did was we first got the thread form and

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we scaled it to high magnification images that we took of the bolt before and after we stretched it significantly, permanently stretched it. Okay. And then what we did on top of that -- what we saw was essentially no change in the thread form, which means no stress or strain or -- pardon me, no permanent strain was developing in the thread form, which goes back to why the cracks are occurring only at the shank in the first lead-in thread. Okay? That data supports that.
Further to that, what we did is we took the entire length of the bolt. And if you go into my file, you'll see where we made precision measurements of each section of the bolt where they were lined up next to each other and they're comparing the lengths and the change of the head, the change of the shank and the change in length of the threads.
So this is all based on a paper that we were -- that your experts supplied where overtorque was being detected by finding strain in the threads. And this evidence shows there's no major permanent strain being developed in the

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threads.
Q You indicated that for the new bolts that you used, you got them from Dallas Airmotive, correct?
A Correct.
Q And are these the same type -- the same bolts that would've been installed in the diffuser assembly?
A Yes. They are MF969624Ps.
Q Same manufacturer as those -- as the one that makes the ones that are actually installed in the diffuser assemblies?
A I don't know if they're the same manufacturer or not. I think they said made in France and every -- excuse me.
Every MS9696 bolt I've seen a certificate for says made in France, so I suspect they're from the same manufacturer.
Q Let me upload an exhibit from the Bickford book.
A What exhibit number is it?
Q Well, it doesn't have one yet because I'm screwing around with it.
Okay. Exhibit 94.
(Exhibit No. 94 marked.)

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BY MS. RATHKE:
Q Chapter 15 of the Bickford book is called Fatigue Failure. Are you familiar with that chapter?
A Yes.
Q All right. I haven't replicated the whole chapter because it's a lot of pages and I'm working from home, but I've got the first few pages of that chapter. Are you with me?
A Yeah. Can you give me one second so I can open it in something that I can view it in? One moment.
Q Yes. Of course.
A Okay. I'm ready when you are.
Q Okay. Let's see what we -- all right. Let's just start on the first page of Exhibit 94, Section 15.1, Fatigue Progress. All right. Sequence of a fatigue failure.
"We learned in Chapter 13 that fatigue will be a potential problem only if four essential conditions are present: Cyclic tensile loads, stress levels above a threshold value called the endurance limit, a susceptible material, and an initial flaw in that material. If these

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conditions are all present, then a natural sequence of events can occur and can lead to a fatigue failure. These events are called crack initiation, crack growth, crack propagation, and final rupture."
Do you agree with that directionally speaking?
A Generally speaking, yes.
Q I mean, I understand. Bickford -- is it fair to characterize Bickford as an academic resource for threaded fasteners?
A I consider him an academic and practical resource for threaded fasteners.
Q Are there instances, however, when real-world application differs from what Bickford recommends?
A I think Bickford does a good job. I don't know that I agree with that. I think Bickford does a very good job of comparing the real world to engineering theory.
Q Okay. Well, let's move on to the third page of Exhibit 94 under the Section 15.1.3, Appearance of the Brake. And let me know when you're with me.

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MR. MARIANI: I'm only able to see two pages on Exhibit 94 when I'm opening it in the Veritext. The third page is blank. It looks like there's three pages total and the third page is blank.
MS. RATHKE: Mine has all three pages. How about yours, Mr. Jones?
THE DEPONENT: I have it.
MS. RATHKE: Okay. Well, Ray, I'm not sure. Maybe Marissa can email it to you. But I'm just going to carry on.
MR. MARIANI: Okay. Hold on a second. I need to see your exhibits you're using as well, not just you. So you need to hold on. I'm going to try to go back out and load it again. It's not showing up.
I don't have page 2 anymore but now I have page 3. So there's some flaw in the Veritext software, whatever. But I can see page 3 now.
MS. RATHKE: There's a flaw in some part of the process.
BY MS. RATHKE:
Q All right. So 15.1.3 on page 3 of Exhibit 94, are you with me, Mr. Jones?

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A Yes.
Q All right. The last paragraph of that section says: "The most common places to find fatigue cracks and failures in bolts are in the regions of highest stress concentration."
Do you agree with that as a general statement?
A Yes.
Q And then it says: "These are where the head joins the shank of the bolt, the thread run-out point, the first thread or two of engagement in the nut, and any place where there is a change in diameter of the body or the shank."
Do you see that?
A Yes, ma'am.
Q Do you agree with that part of the Bickford exhibit, 94?
A Yes.
Q And, in fact, the breakages in the field are occurring in the first thread or two of engagement in the nut, correct?
MR. MARIANI: Objection. Form.
THE DEPONENT: Correct.
\\\

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BY MS. RATHKE:
Q Okay. Page --
A I would say more carefully they're adjacent to the first thread in the nut, but, yes.
Q Referring back to Exhibit 91, your report.
A What's 91?
Q Your report.
A Okay.
Q Page 22, Section 9.0, discussing the testing discussion of testing performance by Fusion Engineering. Let's see.
The first sentence says: "Examination of the data collected indicates that the stretch varies in a linear elastic fashion with the applied torque until approximately 120 to 135 inch-pounds of applied torque."
Does this refer back to the data collected in Section 8.0 of your report or does it refer to something else?
A It refers to Figure 16, which is on page 20 of my report, and it refers to the linear portion of the graph that occurs between approximately 20 and 135 inch-pounds of applied load, or applied torque.

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Q Okay. And what Figure 16 depicts in graphic manner is the results of your testing set forth in Section 8.0 in the previous two pages. Is that a fair understanding?
A Yes. I think that's all of the data.
Q Okay. Got it.
All right. Let's talk about the nut factor. What do you use it for and what's its significance in your analysis?
A Well, in my analysis -- like I said, originally, what I wanted to do, it just seemed to me -- I have a fair bit of experience with bolts, and it seemed to me that Mr. Meyers' numbers were grossly out of range for what I would expect the fracture torque to be for a No. 10 fastener. I mean, he's getting up near 30 inch-pounds. So the first thing I wanted to do was characterize what is the actual nut factor, and for some complicity the nut factor in our case is really characterizing all the frictional characteristics of what we're measuring here.
So what I wanted to know was, is his data correct in terms of are we -- is he getting representative torque displacement values that

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are consistent with what you would expect to actually see.
So I started out by trying to calculate -- I was going to do a calculation, and then I looked up some papers on how to do the calculation. I decided that it would take a lot of work to do that.
So in the alternative, I did the experimental method way to determine what the nut factors were, and there was two reasons why I wanted to do it.
No. 1, I wanted to know if it changed between new and old book, old bolts as it clearly indicated in the Bickford book. Bickford says it in a couple places that you'll see changes when you reuse bolts. So I wanted to determine that.
And I also wanted to get an idea with the Never-Seez, is the nut factor close to what published values are. And the data shows that it is.
My nut factor is close to published data. Mr. Meyers is off by a factor of 2.
Q Have you ever used the nut factor before in any

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professional application?
A Yes.
Q When?
A I had a bolted joint case with a wheel off years ago.
Q Any other time?
A Only in theoretical calculations where I'm using it as the fudge factor, if you will, for a calculation.
Q Okay. My question indeed is, other than the one time that you describe with the wheel off, have you ever used a nut factor before in a practical application?
A Oh, yeah, all the time.
Q I think you just said --
A All the time. No, I thought you meant calculate the nut factor.
If I need to do a bolted joint calculation, the first thing I'm going to do is find the nut factor. I mean, even in my own personal life when I'm building something, if I want to determine the torque I'm going to use on something, I may pull out a representative nut factor to determine where I want to be.

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Q All right. But other than one previous case, you've never in practical application calculated nut factor before? This is your second time.
MR. MARIANI: Objection of the form. Misstates the testimony.
You can answer.
THE DEPONENT: You've asked me two different questions. No. 1, I've used -- performed many calculations in the past for nut -- with using a nut factor. I have done an experimental test to calculate the nut factor at least two times as it relates to litigation cases.
BY MS. RATHKE:
Q All right. There's an article in your literature file called Bearing Friction Torque in Bolted Joints.
Are you familiar with that?
A I think I am. Could you give me the author, please?
Q I will do you one better and I will introduce it as Exhibit 95. And you can tell me whether what I've introduced is, indeed, literature that came from your file.

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(Exhibit No. 95 marked.)
THE DEPONENT: Yes, this came from my file.
BY MS. RATHKE:
Q Okay. And just for the record, will you agree that what's been marked as Exhibit 95 to your deposition is an article called Bearing Friction Torque in Bolted Joints. The lead author is Sayed, S-A-Y-E-D, Nassar, N-A-S-S-A-R. And the article is dated February 12, 2004.
Fair enough so far?
A Yes. Nassar, yes.
Q Do you regard Exhibit 95 as authoritative in any way?
A I downloaded this paper -- funny you ask this question. I downloaded this paper because I was thinking about doing some calculations to incorporate friction into -- before I did some testing, and that's why I downloaded this paper. I don't recall much in it. It just convinced me that doing an experiment was a better deal than doing a calculation.
Q Okay. Turn, if you will, to what's probably the third or fourth page of the PDF, but the introduction section of the article marked as

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Exhibit 95, please.
A One moment.
Q You bet.
A The introduction?
Q Yes, sir.
A Yep. Okay.
Q Okay. First sentence reads: "The safety, reliability, and the quality of bolted assemblies are significantly affected by the level and by the stability of the fastener tension, which is most commonly achieved by either churning of the head or the nut of the threaded fastener."
Do you agree with that statement?
A Yes.
Q Okay. And then the article describes the difficulty in achieving torquing power without losing torquing force to two different types of friction.
Is that fair enough as a general statement?
A Yeah. This paper is just basically about how to calculate friction in a joint.
Q Yes. All right. Why don't you -- the last paragraph on the page that we're on with the

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introduction, that last paragraph says: "The torque tension relationship is often simplified by using a tabulated constant known as the nut factor."
That's what you're doing, correct?
A Yes.
Q Then it says: "Juvinall" -- that is J-U-V-I-N-A-L-L, and that's a name, it's a reference to an article -- "provides an approximate value of 0.2 for the nut factor but cautions against using it for critical joints without providing guidance as to establish a more reliable yet practical torque tension relationship."
"Bickford provides some mean values of the nut factor for various combinations of joint materials and surface conditions; however, the scatter in the nut factor is too great to render it reliable, particularly in critical joints."
Do you agree with what I read?
A Well, yes, I do because he's speaking of book values for nut factors, not calculated No. 2s.
Q Where does it say that?
A Because he says right there, "Bickford provides

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some mean values of the nut factor for various combinations of joint materials and surface conditions; however, the scatter in the nut factor is too great to render reliable, particularly in critical joints."

In other words, if you would go to refer into Bickford, Bickford would say the best way to get a nut factor to apply to a joint would be to actually do the experiment that I did.

Q And the diffuser bolt constitutes a critical joint, correct?

A That's an answer for Pratt & Whitney.

Q Let's refer back to Exhibit 91, which is your report. Page 27.

Near the end of that page there's a sentence that says: "Literature also shows that simply reusing bolts that have been installed can cause the nut factor to increase or decrease, which will thereby alter the effective preload. To mitigate the risk of joint failure due to the changes in preload, manufacturers typically recommend replacing bolts when they are removed on critical joints."

Do you see that?

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A Yes.

Q It is your understanding that the diffuser bolt constitutes a critical joint, correct?

MR. MARIANI: Objection. That was just asked two questions ago.

You can answer it again.

MS. RATHKE: Thank you.

THE DEPONENT: Like I said, I think that's something for Pratt & Whitney. It's not for me to decide. It's their engine design. And I would say as of now they consider it a critical joint because they're recommending that the bolts be replaced upon service.

BY MS. RATHKE:

Q Okay. We're in agreement.

The sentence that I read, the two sentences that I read, the first one that says "Literature also shows that simply reusing bolts that have been installed can cause the nut factor to increase or decrease which will thereby alter the effective preload," and then you cite generally to Bickford, an introduction to the design and behavior of bolted joints, but you don't have a pin cite.

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How certain are you that this proposition is supported by that Bickford source?

A Would you like me to show you the page?

Q Sure. If we can do it, like, reasonably quickly.

A I'm using the 3rd Edition of Bickford. I think you have the 2nd. On page 229 of the 3rd Edition, it's covered in detail. Actually, it starts on page 228.

"Many investigators have found, in fact, that nut factors determined on a sample" -- no, that's not right. Yeah.

Q Mr. Jones, you got to kind of slow it down for the court reporter to have any chance of following you here.

A Okay. Yes. So on page 229, it says: "A diesel manufacturer reported privately that the torque required to achieve a desired preload in engine head bolts increased by 50 percent with four reassembly operation using the same parts."

In other words, to get the preload the torque had to go up by 50 percent.

The nut factor in this case increased by 50 percent with the reuse of the fasteners.

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Another example is an aerospace manufacturer using a seven-eighths of an inch diameter bolt that was tightened and loosened and then retightened back to the preload. I'm paraphrasing here. In that particular case, the torque decreased by about 50 percent to get the same preload.

Q And is your testimony that this is the portion of the Bickford treatise, the 3rd Edition that supports the contention in Exhibit 91 that ends with footnote 15?

A Yes. I know it's in another place, but that's the one I could find readily.

Q Okay. Is it in another place in the Bickford book or is it another source?

A Well, I think I've given you more than enough to support what I stated right there, right there.

Q Well, I just want to make sure I have the complete accounting of --

A It's in Shigley as well.

Q And you're referring, of course, to Shigley, S-H-I-G-L-E-Y, and Mischke, M-I-S-C-H-K-E, their 6th Edition, Mechanical Engineering Design, naturally?

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A Yeah, a machine design book.
Q Okay. You also don't have a pin cite for that.
So directionally which chapter would that be in, in the Shigley --
A Here. I'll get you that reference as well. One moment.
Okay. On page 473 of Shigley: "The prudent designer protects against these circumstances because the reassembled joint is different, in italics, only to the permanent set and the fasteners for which torque tension relationship is now unknown. Furthermore, for the same torque, the initial tension will be less than the designer had specified."
He's citing a specific example here. But he's saying the exact same thing that I just pointed out in my report. That's page 473.
Q Okay. Have you now shared with me all of the sources that you believe support your statement ending with footnote 15 in your Exhibit 91?
A Oh, I'm sure there's others but those are the two that I used as a cite. It's pretty well known.
It's also in The Handbook of Bolted Joints.

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It's probably the same verbiage.
Q The other Bickford?
A Yes.
Q Of the handbook Bickford?
A Yes.
Q All right. Within your Exhibit 91, you have some commentary and discussion on the bolt removal testing done by Mr. Meyers at EMS in Clarksburg, West Virginia, in December, correct?
A Yes.
Q All right. Are you aware that the protocol for that bolt removal testing was approved by all of the parties to this action before it was done?
A No.
Q So I take it you did not have an opportunity to review the protocol of that testing before it was done.
A I looked through my file last night. I don't have a protocol.
Q And I take it that you were not at the December 2019 West Virginia inspection, correct?
A No, I was not.
Q Were you invited?
A I didn't attend. I wasn't asked to attend.

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Q Okay. And the reason that you didn't attend is because you weren't asked to; is that correct?
A Correct.
Q Do you have knowledge as to how much tensile force a diffuser bolt on a PW530A engine is subject to during operation?
A In addition to the preload?
Q Yes.
A No. I suspect that most loads that are -- it's subjected to are probably more on the range of prying and bending loads than pure tension loads.
Q And what's your suspicion based on?
A The shape of the joint, the eccentricity of the joint.
Q And what do you mean by that exactly?
A Essentially it's a flange joint, and because it's a flange joint, the way it's going to be loaded, it's going to create prying on the joint. And that is a condition that you have to be aware of in a bolted joint design.
Q I am turning back to Clarksburg. How would you have measured the torque of the diffuser bolts that were still installed on the subject

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engines?
A Honestly, I would have verified that they were all torqued over 30 inch-pounds. And I would have walked away if I wanted to know the actual removal torques, I would have had a wrench large enough to actually get the removal torque.
Q And is that your only criticism of Mr. Meyers' breakaway torque measurements?
A I think I summarized my criticism of his measurements in my report thoroughly.
Q But what would you have done?
A Well, that's a loaded question because I don't see any evidence of overtorquing on any of this stuff here. I wouldn't -- if I was concerned, I would have been concerned about undertorquing. And as soon as I found out that the breakaway torques were all exceeding the specified number, I would have been happy and walked away.
Q Okay. But let's just say for whatever reason, you feel duty-bound to measure the breakaway torques of the still-installed diffuser bolts and nuts.
How would you have gone about doing that?
A Well, I would have done it with a torque wrench

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that could register the value of the actual breakaway torque.
Q What else would you have done different from what Mr. Meyers did?
A Well, I would never -- I would never have done the other test that he did, the reinstallation test and the measurement test. As I've covered, those tests are completely invalid.
Q Okay. But with regard to the breakaway torque measurement, what else would you have done different from what Mr. Meyers did, other than having a bigger wrench?
A I would have recorded the numbers.
Q Okay. Anything else?
A I already told you, I consider the whole concept of the test invalid. So I told you what I would have done if I were to do testing. I don't know what else to say.
Q Well, I know you consider the test to be invalid, but if you wanted -- if you thought breakaway torque was of concern, if you thought torque values were of concern, how would you measure breakaway torque, or how would you try to measure the torque of still-installed bolts,

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or would you not try to do it because it's not --
A It's like I said, you can't do it. It's stated in the literature. You know, breakaway torque is good to determine if a bolt's torqued enough. You're never going to get an answer if it's overtorqued by doing what Mr. Meyers did. And it's reflected in the literature everywhere. And anecdotally I can tell you that as well.
Q Okay. And you quote the Bickford book for that proposition, that you can never return to a previously tightened bolt and measure the residual preload accurately with torque return tools, right? That's kind of what you're getting at?
A Well, I would say you can if you do it right away, but after it's been in service for a while, no.
Q And what do you mean by "a while"?
A Pardon me?
Q What do you mean by "a while"? Where is the dividing line between when it works and when it doesn't work?
A I don't know if I could give you an exact time,

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but I would say after it's been operating in an engine for a period of time, it's no longer valid.
Q Like a week?
A If it's been in the engine a week, yes. If the engine has been running.
Q Okay. Yes, valid, or yes, invalid?
A Well, I haven't done the testing to confirm where the validity begins and ends, but I can tell you that as soon as the engine is exposed to temperature and it's been run and it's been subjected to the operational stresses, at that point all bets are off.
Q Okay. You understand that Pratt & Whitney is the designer of these bolts, correct?
A No, I don't understand that they designed these bolts.
Q Okay. As between the parties involved in this litigation, or the entities involved in this litigation, Pratt & Whitney is in the best position to understand the physical properties of these bolts, correct?
MR. MARIANI: Objection as to the form of your question. Lack of foundation. Improperly

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characterizes the parties in the case.
You can answer.
THE DEPONENT: I don't think that Pratt & Whitney is in any better position than Fusion Engineering or ESI to characterize the properties of these bolts.
BY MS. RATHKE:
Q Well, when I asked you if these bolts and nuts constitute critical joints, you indicated to me that that's a question for Pratt & Whitney, correct?
A About the joint, yes. It's the joint. You were asking me about the bolts previously. Now you're asking me about the joint.
Q Okay. Your belief is that Pratt & Whitney is not in the best position to characterize the bolts but it is in the best position to characterize the joints; fair enough?
MR. MARIANI: Objection of the form. Vague.
You can answer.
THE DEPONENT: I didn't say -- that's not what I said. I said that the material -- the properties of the bolts could be determined by

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Fusion Engineering, ESI, or Pratt & Whitney. I also said that Pratt & Whitney did not design the bolt. The bolt is a standardized design by a standard.
BY MS. RATHKE:
Q Is Pratt & Whitney the best party -- the party in the best position to characterize the properties of the joints?
A I would hope they have the most data, yes.
Q And you do not believe that Pratt & Whitney is the designer of these joints or of the bolts?
MR. MARIANI: Objection. Compound. You can answer if you know what the question is.
THE DEPONENT: I believe that Pratt & Whitney specified these bolts.
BY MS. RATHKE:
Q Who do you think manufactures them?
A I think they might have been manufactured by Textron.
Q What's that based on?
A The card that I saw that came with the bolts. Like I said, it said they were made in France, and I think it had Textron on it.

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And I think when you do a search for the part number for the bolt, it comes up as Textron a lot.
Q Let me upload an exhibit here.
(Break.)
(Exhibit No. 96 marked.)
BY MS. RATHKE:
Q I've marked on the screen, if you look, I've marked Exhibit 96 to your deposition, which I'll say for the record is a Pratt & Whitney Materials Investigation Laboratory Report, ME174647 -- sorry, 64FS.
MR. MARIANI: Give me a second to open it up, please, before you continue.
BY MS. RATHKE:
Q Mr. Jones, let me ask if you've seen Exhibit 96 before.
A One moment. Let me just get this up. I apologize. I was trying to get it to download and it was just hanging up on me here.
Okay. So this is the Pratt materials laboratory report?
Q Yes.
A Do you have a problem if I work off my own copy?

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Q I do not.
MR. MARIANI: Give me one second. I've opened it three times, and it keeps opening but not the whole document. So assuming you're going to be going through various pages, I can't see it all. So the same problem we're having before.
Rich, do you know any solution on this, why some exhibits we're only getting to see some of the pages when we open them?
THE DEPONENT: I can't find my copy, so I'll work with yours. Okay.
BY MS. RATHKE:
Q Have you seen Exhibit 96 before?
A Yes.
Q And Exhibit 96 is a Pratt & Whitney investigation as to another MS9696-24 diffuser bolt failure; yes?
A Yes, from DAO517.
Q Yes.
All right. If you turn to the fourth page of the PDF, you should be on a page that two-thirds of the way down the page there should be a header called Discussion. Let me know when

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you're there.
A Yes.
Q All right. The last paragraph on that page says: "The analyses performed by the chemical technology and tests suggests that an anti-seize compound has been applied on the threads; therefore, the expected clamping force should have been obtained if the torque was properly applied. The latter can generally be assessed by measuring the breakaway torque upon their removal if the assembly has not undergone some distress where cracking fracture."
Do you see that?
A Yes.
Q Fair to say that Pratt & Whitney uses -- the manufacturer of this bolt or the designer of this joint uses breakaway torque to characterize the torque value of the joint?
MR. MARIANI: Objection. Calls for speculation.
You can answer.
THE DEPONENT: I'm sorry, Ray.
MR. MARIANI: Yep. I said objection. Calls for speculation.

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You can answer.
THE DEPONENT: Okay. So what they're talking about here is, if you read this in the correct context, which I don't think you are, they're talking about the use of anti-seize to verify that anti-seize was put on the thread so they get the correct preload when they install it. What he's concerned about is it being undertorqued or not having enough preload, and I agree with his statement that you can measure breakaway torque to determine if you had enough. It's just hard to tell -- it doesn't give you good information if it was overtorqued, unfortunately.
BY MS. RATHKE:
Q The purpose of breakaway torque is to just simply measure the amount of torque, is it not?
A Yes, the required torque to get it to move.
Q Yes. Which is something that Pratt & Whitney has done in this Exhibit 96, correct?
A No, they haven't done. They suggested it.
Q All right. They suggested it.
And it's the same bolted joint at issue as the one at issue in our case.

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A Yes.
Q All right. Let's -- you know, I'm going to introduce an exhibit that we found that came from your files. Let's see here.
I'm terrible at this.
All right. Here we go. I'm marking Exhibit 97, which is a paper that came from your working files. It should now be uploaded. Let me know if you recognize it.
(Exhibit No. 97 marked.)
THE DEPONENT: Yes.
BY MS. RATHKE:
Q Okay. And Exhibit 96 -- sorry, 97, which came from your files, is a certificate of conformity relating to the MS9696-24 bolt, correct?
A Correct.
Q And it is in French but it is from Canada, correct?
A Yep.
Q And Exhibit 97 indicates in the box on the far right-hand side, if the thing was oriented correctly, indicates that the manufacturer of this bolt is Pratt & Whitney. Do you see that?
A On the right-hand side?

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Q Where it says manufacturer, yes. Box 12.
A Status work, manufactured.
Q Yes.
A That means it's a manufactured part.
Q Are you familiar with these certificates of conformity?
A I've seen them before.
Q All right. Do you understand that box 12 means that the entity indicated in box 4 is the manufacturer, correct?
MR. MARIANI: I want to ask you to hold one second. I can't see the document in the Veritext platform because it's sideways. And if I try to blow it up, it becomes distorted. So I can't see it there. So I've got to open it in the production that was (connection interruption), so hold on, please.
Are you referring to the first or second page of the exhibit, Sarah?
MS. RATHKE: Page 1.
MR. MARIANI: Okay. It's still -- when you blow it up, it's -- maybe yours is clear. Mine is completely blurry when I blow it up to try to see what it says in these boxes.

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MS. RATHKE: Ray, we all deal with challenges. We're doing the best we can.
MR. MARIANI: Aaron, are you able to read this document by pulling it up?
MS. RATHKE: Me? Yes.
THE DEPONENT: Yes.
MR. MARIANI: All right. Go ahead.
BY MS. RATHKE:
Q All right. You understand that the box 12 of these forms indicates that the entity indicated in box 4 is the manufacturer, correct?
MR. MARIANI: Objection. Calls for speculation.
THE DEPONENT: You said before box 12.
BY MS. RATHKE:
Q Yeah. Box 12 is --
A You were talking box 4 or box 12?
Q Box 12 indicates that the entity in box 4 is the manufacturer.
MR. MARIANI: Calls for speculation.
THE DEPONENT: I don't know for sure because I look at the bolts and it says -- or the nuts and it says new, in box 11 and 12 notes --

BY MS. RATHKE:
Q So Exhibit 97 -- page 1 relates to bolts, not nuts. You see that, correct?
A Correct. I'm going to answer your question by saying I don't know.
Q Okay. So you just don't know who the manufacturer is of these bolts?
A I just know that when I ordered -- and I'm working on memory here. No, I don't know for sure. For some reason I thought it was Textron Aviation manufactured them, but I could be completely wrong.
Q Okay. And is what's been marked as Exhibit 97, is this the French language document that you were thinking of that you referred to earlier?
A I think so, but I thought there was another one. It might be with our evidence artifacts, but I don't recall.
Q Okay.
A It might have been on the receipt or something that came on the nuts. I don't recall, but I don't profess to know everything about that -- I think that's like an airworthiness or approved part. I don't profess to know that type of

stuff.
Q Okay.
A That would be for Mr. Cheyne.
Q All right. You said that you reviewed a quantity -- or somebody from your office reviewed a quantity of NTSB investigation reports in connection with this matter that Mr. Meyers described in his expert report; is that a fair characterization?
A Yes.
Q All right. Let me mark another exhibit. In a moment Exhibit 98 should be evident to you on your screen.
MS. RATHKE: Ray, I suspect you're going to have to refresh. We'll wait for you to do so.
THE DEPONENT: Ray, I do believe you're jinxing me.
MR. MARIANI: Same issues. It comes up, but so far it's all blank pages.
MS. SUSZYNSKI: I actually get blank pages on this one too.
THE DEPONENT: I get seven blank pages.
MS. RATHKE: All right. Marissa, can you reload this one?

MS. BLACK: It's already done, Sarah. It's reloaded.
THE DEPONENT: All I'm getting is an exhibit number.
MS. RATHKE: Yep. Hold on a second. Let me try this again. It's going to give it a new number because I don't have any choice, so bear with me. What's coming up should be Exhibit 99.
(Exhibit No. 99 marked.)
MS. RATHKE: And with any luck it will be visible.
MR. MARIANI: Aaron, are you able to open it?
THE DEPONENT: Yes.
BY MS. RATHKE:
Q Okay. Is Exhibit 99 an NTSB aviation incident final report that you examined because it was in Mr. Meyers' expert file?
A I will verify it. I assume you got this out of my file, but I'll verify it.
Yes, I have it in my file.
Q All right. Starting out on the first page under Analysis, Exhibit 99 states: "The pilot

executed a forced landing when the airplane experienced a total loss of engine power during cruise flight. Examination of the engine crankshaft and attached rod components revealed that both nuts on the No. 3 connecting rod were backed off from their original installed position. One nut on the No. 4 connecting rod had also backed off but had not failed."
Do you see that?
A What page are you on?
Q No. 1, first few sentences.
A Yeah. One moment. Let me open it in my system viewer. This thing is terrible. I apologize.
Okay. Yeah, I have it now. First paragraph.
Q Yeah. I read the first three sentences.
A Okay.
Q Okay. Flip to page 4 of the PDF. Fourth paragraph down, starts with the words "The position." And let me know when you're with me.
Okay. You're with me. I'm going to read that into the record.
"The position of each nut was marked relative to the rod and two sets of torque

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measurements were recorded for rods 1, 2, 5, and 6, using a 300 inch-pound maximum peak recording torque wrench. Breakaway torque was measured during initial disassembly.

"After the breakaway torque was measured, the torque required to return the nut to its original position was also measured. In all instances the breakaway torque exceeded the 300 inch-pounds, 25 foot-pounds rated capacity of the wrench. Most of the return -- sorry -- most of the return-to-position torque values also exceeded 300 inch-pounds."

Do you see that?

A Yes.

Q So is it fair to say that at least in this investigation, the NTSB uses breakaway torque to try to determine what the torque values were in operation?

A Well, this is a different component, yes. And as I said before, I've said numerous times, I don't have a problem with it looking for a condition of undertorque. It's just anything that's been in service, you're not going to be able to determine if it's been overtorqued.

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Q In Exhibit 99 --

A It also lists here that the torque for the rod bolts is 40 foot-pounds, so I'm not surprised they're not getting anywhere with a 300 inch-pound wrench. So in this particular case they're talking about an undertorqued bolt.

Q Exhibit 99 simply measures the torque value, without reference to overtorque or undertorque, correct?

A Well, it can't be measuring the actual torque value if the spec is 480 inch-pounds and they're measuring it with a 300 inch-pound wrench. To me, it doesn't mean anything.

Q Well, it means that they're measuring breakaway torque, correct?

MR. MARIANI: Objection. Asked and answered.

THE DEPONENT: They are trying to measure a breakaway torque that's listed higher than a torque wrench they're using.

MR. MARIANI: Asked and answered.

THE DEPONENT: The listed torque spec is 480 inch-pounds, and they're attempting to measure the torque using a 300 inch-pound torque wrench.

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BY MS. RATHKE:

Q So the answer to the question, they're attempting to measure breakaway torque is correct?

A Obviously they're looking for an undertorque situation, so it's a different situation, as I've said before.

Q Can you show me where the word "undertorque" appears in Exhibit 99?

A The only logical conclusion that I can take from this is they're looking at undertorque, because if they were looking for overtorque or anything else, they would use a torque wrench that was appropriate for the specified torque on the bolt.

Q So your testimony is that breakaway torque is a valid way of measuring an undertorque situation?

A Breakaway torque can be valid for looking for a condition of undertorque. I mean, we see this all the time. We do it all the time.

A good example -- a good and simple example would be a wheel separation from a car. In that particular instance, you're looking for evidence

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of undertorque all the time because it's not uncommon for an installer to do it, undertorque them. And what you'll do is go and measure the torque, the breakaway torque.

If the breakaway torque -- let's say the specification was 100 foot-pounds, as an example. We're just going to pull a number. And if we find the breakaway torque -- you know, tightening breakaway torque is in the 90 to 150 range, we're going to say it's okay.

But I've had -- as a simple example, I've had wheels that I know were torqued to 100 foot-pounds that have taken over 200 to break loose. It's the nature of a bolted joint.

Q What a breakaway torque measurement produces is an integer torque value, correct?

MR. MARIANI: Object to the form. Incomplete hypothetical.

You can answer.

THE DEPONENT: Depending on the wrench.

BY MS. RATHKE:

Q No matter what torque wrench you use, a breakaway torch measurement produces an integer that is a torque value, correct?

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MR. MARIANI: Same objection.
THE DEPONENT: Same answer.
BY MS. RATHKE:
Q What torque wrench does not produce an integer torque value?
A A digital one that reads in fractions of a foot -- inch-pound or foot-pound.
Q I see.
So a breakaway torque measurement produces a net value, correct?
A It produces a --
MR. MARIANI: Objection. Incomplete hypothetical.
You can answer.
BY MS. RATHKE:
Q Please answer.
A I said it produces a measured value.
Q I've marked Exhibit 100 to your deposition, which is a NASA document entitled Standard Threaded Fasteners, Torque Limits For.
Let me know when you've gotten it up.
(Exhibit No. 100 marked.)
THE DEPONENT: Is it a 486 document?
\\\

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BY MS. RATHKE:
Q I don't know what you mean but a -- yes. Yes, it is.
A I'm going to use my own copy. But, yes.
Q Is "verification torque" another word for breakaway torque?
A One moment. Let me bring it up.
You're referring to page 11 of that document, I'm assuming, on page 4 of the document, page 11 of the PDF?
Q Yeah. Is "verification torque" another word for breakaway torque?
A I'm reading this as -- I guess so. I've seen this term used in here before, and I think it's kind of a vague term because it's not a typical industry term. But I suspect that's what they're saying here.
Q And fair to say --
A On page 3 where they give that a definition as well.
Q Fair to say that NASA defines, at least in Exhibit 100, defines verification torque as: "The torque required to initially move the wrenched fastener from the assembled condition.

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Verification torque is always measured in the tightening direction, and it usually exceeds the maximum limit of the desired installation torque.
"It is normally used to, No. 1, break loose the net seizure effects before encountering the corrosive effects when the fastener assembly is disassembled; No. 2, initially deform the captive internal thread element on blind fasteners with threaded cores; or No. 3, to determine the magnitude of the installation torque after a given span of time after cyclic, thermal, or vibration loading, et cetera."
Correct?
A Yes. Yes, I agree with that. I read that.
Q All right.
A Just noting on that document that you note that that value is higher. Exceeds the maximum limit of the desired installation torque. So that goes back to what I was talking about, related to trying to make sure things are not undertorqued.
Q Have you ever seen the Pratt & Whitney drawings for the diffuser bolt at issue in this case?

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A I've seen the mill spec and the SAE drawings for them. They're in my report.
Q What is your basis to believe that the mill spec and the SAE spec are the binding specification in this instance, rather than proprietary Pratt & Whitney specification for use in aviation settings?
MR. MARIANI: Objection to the form.
You can answer.
THE DEPONENT: Because they're using a mill spec number and nomenclature system.
BY MS. RATHKE:
Q Any other basis for your belief?
A No. That's what I need.
Q And have you seen any document showing Pratt & Whitney's own tolerance for these bolts?
A No. It's a commodity bolt, though. I mean, you can buy it from any number of people. So I'm sure it's the same. That's the SAE standard for the part number.
Q How do you know that?
A Because it says correctly on it, and it designates it right on the conformance certificate.

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Q Well, what is the significance of that?
A That means it conforms with SAE -- or pardon me, AS9696, which is an SAE standard. Or they're representing it to conform with that.
Q Sure. But what is your evidence that Pratt & Whitney doesn't have a proprietary standard where the tolerances are tighter?
MR. MARIANI: Objection. Lack of foundation.
You can answer.
THE DEPONENT: Well, the bolts that I've measured from service suggests that they're following the tolerance guidelines that are outlined in the standard.
BY MS. RATHKE:
Q Yes. They're within those guidelines, yes.
But what's your understanding that Pratt & Whitney doesn't have independent tolerances for these bolts that are used in the aviation application?
A They're only aviation application bolts.
Q They're military application bolts.
A Aerospace application. AS, aerospace. That's the standard.

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Q After removing engine 687 Bolt 15, Mr. Meyers marked where the bolt had been when it was fully torqued and reinserted it into the diffuser and torqued it to 30 inch-pounds and 74 inch-pounds, and noted that it still had not reached the original installation mark.
Your report in Exhibit 91 indicates that this test is not valid because the bolt had old Never-Seez on it and because Mr. Meyers had used turbine oil as a lubricant and because you believe he did not clean it, correct?
A Correct.
Q Page 36 of your report, Exhibit 91, first paragraph, second sentence indicates: "After removal, the bolt was not cleaned, coated with an unknown grade of turbine oil, and reinstalled to 30 inch-pounds of applied torque."
Where did you get the information that the bolt was not cleaned?
A It wasn't registered in his report, and I believe I examined the bolt afterwards at Fusion Engineering.
Q Okay. If your presumption is incorrect and he had, in fact, cleaned the bolt, would that

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change any of your conclusions?
A No. No. The bolt was reused. I wouldn't expect it to go back the same way.
Q Are you aware that Pratt & Whitney's instructions allow the use of turbine oil as a lubricant instead of Never-Seez?
A Regardless if they do, it's not the same as was installed at the time it was administered and the threads have changed. It's irrelevant.
Q Page 36 in the second paragraph indicates -- starting with the second sentence: "Images of the bolt DA68715 taken by Fusion Engineering clearly show that residual Never-Seez was present on the bolt from the time the diffuser bolt was installed by Dallas Airmotive during overhaul. In order to properly install the bolt, the residual Never-Seez that was present on the bolt should have been removed to eliminate potential frictional changes."
Do you see that?
A Yes.
Q And that is what you attempted to depict in Figure 26 on page 37, correct, entitled Dried and Cracked Never-Seez?

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A That's a different bolt.
Q Correct. Why would you -- if you're discussing Mr. Meyers and his treatment of Bolt 15 from engine 687, why would you include a picture of Bolt 3 to illustrate that?
MR. MARIANI: Objection.
THE DEPONENT: Probably --
MR. MARIANI: Excuse me. Objection. Misstates the report.
You can answer.
THE DEPONENT: Probably because the image in 26 was a clear image and easier for a reader to understand what I was speaking about.
BY MS. RATHKE:
Q Do you have photographs that purport to show that Bolt 15 has residual Never-Seez on the threads?
A I will find it.
Yes, I do.
Q Does that -- does your photograph have a Bates label or any other identifying information?
A Yes. I don't know the Bates number for it, but I can tell it to you. It's VHX, "Victor Harry X-ray," 000189. And it is in my file under DAI

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bolt inspection 120, 2020 Kea.
Q And was the inclusion of the photograph of Bolt 3 in Figure 26, was that an accident or was that intentional?
A No. Like I said, it just was a little bit more clearer. And I also wanted to show what the Never-Seez looked like before it was -- had oil put on it by Mr. Meyers in his test.
Q Page 38 of your report, which is Exhibit 91. You also criticize Mr. Meyers' marking analysis with reference to the diffuser assembly conditions and in particular with the fact that the diffuser is heated before the final assembly, and the difference --
A One moment, please.
Sorry. Can you refer me -- I was trying to find my report again.
Q 38.
A Page 38?
Q Yep.
A Give me one moment to close some documents here. I've got so many open I can't find out where I'm at anymore.
Q Okay.

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A So Exhibit 91, page 38?
Q Yep. Probably 39 of the PDF.
A Yes.
Okay. I'm sorry. Go ahead.
Q All right. Here you're criticizing Mr. Meyers' marking analysis with regard to the fact that the diffuser is heated before final assembly and the difference in thermal coefficient of expansion between the bolts and the diffuser materials, the titanium diffuser material.
Is that a fair characterization?
A I'm saying that he didn't take that into account.
Q Yes. Right.
Middle of the paragraph on page 38 states: "This data indicates that if the bolt temperature increases to nearly the same temperature as the diffuser assembly prior to torquing, the thickness of the titanium diffuser housing will decrease less than the length of the bolt as the assembly cools.
"As a result, the apparent torque present on the bolt after the assembly reaches room temperature will be higher than the

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30 inch-pounds due to the greater stretch developed in the bolt because of the difference in TCE, thermal efficient expansion, between the materials.
"The effect of the assembly temperature may also have a large influence in the marking method employed by Mr. Meyers on Bolt 15 of engine DA687, yet it was not considered in his analysis."
First question is: Did you run this paragraph by anyone at Dallas Airmotive before putting it into your report and specific -- well, let's just stop there.
Did anybody from Dallas Airmotive review that paragraph?
A I don't know. Not that I recall. Maybe after I wrote the report.
Q To your knowledge, did anybody from Dallas Airmotive vet or review the theory that after the diffuser cools during the assembly process, the bolts will be overtorqued rather than undertorqued?
A No. I said it's a possibility.
Q Okay.

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A As I said, if the bolt comes up to temperature of the housing, you're going to run into that condition.
Q All right. Do you have --
A I didn't run any experiments to see how that effects breakaway torque, let alone the temperature and vibration effects that have been going on in the engine for several thousand hours, but that's just another point.
Q And my question is: Did you actually run by anybody at Dallas Airmotive the theory that it would have an impact --
MR. MARIANI: Objection. Asked and answered.
BY MS. RATHKE:
Q -- that this should be taken into account?
A Well, I don't think that Dallas Airmotive -- Dallas Airmotive is following the procedure that's dictated by Pratt & Whitney. So I don't know -- I can determine the effect by calculation.
I don't have to run it by them. But it's another -- what we were talking about earlier where you get statistical differences and you're

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getting into statistical failure.
What if Pratt & Whitney does it a little bit faster or a little bit slower than Dallas Airmotive, you may be getting different preloads on those bolts. We don't know. You don't know, neither do I. And neither does Mr. Meyers.
Q Well, did you run by Dallas Airmotive the theory that as a result of the heating in the assembly process, it's even possible, it's physically possible that the bolts at the end of that process will be overtorqued?
A I didn't say overtorqued. I said the preload would change.
Q Do you know why the diffuser assembly is heated prior to reinstallation?
A I think it has to get a bearings assembly in place.
Q And what do you mean by that?
A I think you have to heat it. I don't recall exactly, but I believe heating it has to do with lining it up with the bearing assembly, that it -- the No. 4 bearing assembly that it rides over.
Q And do you have any data concerning the

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temperature of the diffuser bolts during the reassembly process?
A No. The data I have says take it out of the oven, put the bolts in, and then put it together after you lower it in.
Q And I take it you've never observed the installation of a diffuser?
A No.
Q And I take it also that you never discussed that process with any Dallas Airmotive mechanic or any other Dallas Airmotive employee?
A No. I discussed how they put it together.
Q With whom?
A With Ian Cheyne and John Fallor.
Q And specifically what did you discuss?
A I wanted to confirm that they heated up and then put the bolts in it before they assemble it.
Q And do you have an understanding as to why the bolts are torqued twice?
A Well, you want to verify your torque when it cools down. That's pretty common. If you're putting something together that's been heated and it's going to sit at room temperature, it's not uncommon to require a second check of

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torque.
And especially if -- for instance, if this was the steel housing, if this was the steel housing with the Waspoly bolt, I believe you'd be looking at a different situation, so you would want to verify that you maintain torque because of the TCE differences in those materials.
Q 400 degrees Fahrenheit is not an extremely high temperature. Is that a fair characterization?
MR. MARIANI: Objection of the form.
THE DEPONENT: It's a relative -- extremely high relative to the sun? Relative to room temperature?
BY MS. RATHKE:
Q Relative to, you know, moving metal.
MR. MARIANI: Objection of the form.
THE DEPONENT: Moving metal, you're talking about 5 microinches -- 5 to 7 microinches per degree. That's real. That's a span from 400F -- let's say 75 to 400F. That's 325 degrees. 325 microinches. That's more than a thousandth of an inch.
\\\

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BY MS. RATHKE:
Q You cook a pizza at 400 degrees Fahrenheit, correct?
A Yes.
Q All right. You had some comments on Dr. Baron's report as well, correct?
A No. I want to quantify something first.
If we were to assume that bolt was exposed to 400 degrees when it was -- from room temperature, it would grow by three-thousandths of an inch. That is more than the stretch required on the bolt for the torque range.
Q Is it your understanding that the bolt itself heats to -- you understand that Pratt & Whitney does not instruct anybody to heat the bolts, correct?
A No. They instruct the user -- the overhaul to put the bolt into the hot surface.
Q Is it your belief that the bolts reached the temperature of 400 degrees Fahrenheit during that process?
A I don't know.
Q Well, does it seem particularly likely that the bolts reached 400 degrees?

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MR. MARIANI: Objection. Calls for speculation.
THE DEPONENT: I wouldn't be surprised if they reach 250 or 300. I don't know that they would reach 400.
BY MS. RATHKE:
Q Okay. Thank you.
All right. Now, studying page 39 of Exhibit 91, you offer your thoughts concerning Dr. Baron's report; fair?
A 39?
Q Page 39 of your report.
A Yes.
Q Actually, go to page 43 of Exhibit 91, where we've got Figure 32.
A Okay.
Q All right. You've got an arrow pointing to something you call Possible Striations.
A Yes.
Q Why do you think that it's merely possible rather than that they are striations?
A Because they could be just -- they could be evidence of propagation marks. I think it's evidence of fatigue. I just didn't want to say

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it's definitely a striation or moreover a propagation mark.
Q Okay. What's the largest magnification at which you viewed the photograph depicted in 32 of Exhibit 91?
A It's exhibited at 1,000X.
MS. RATHKE: Okay. Let me --
(Discussion off the record.)
MS. RATHKE: Let's take five now. I don't expect a huge amount of time after we're done -- I mean, after we come back. So let's take five.
THE DEPONENT: Can you give me 10? Just because I got to run, do something real quick. Thank you.
MS. RATHKE: You bet.
(Break.)
BY MS. RATHKE:
Q All right. So I've marked what should -- we were talking about Figure 32 on page 43 of your expert report marked as Exhibit 91. My question is if you've blown that up in magnification, I need to see if you can determine whether what you've indicated as possible striations are, in fact, striations. So let me draw your attention

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to what's been marked as Exhibit 101.
(Exhibit No. 101 marked.)
MS. RATHKE: Hopefully it's there.
MR. MARIANI: I'm only up to 100.
MS. RATHKE: Well, you got to refresh.
MR. MARIANI: I did.
MS. RATHKE: I'm asking the guy with Internet service.
THE DEPONENT: I don't have 100. Mine ends at 100 right now, Sarah.
MR. MARIANI: Yep. Same problem.
MS. RATHKE: Now it's working. All right.
THE DEPONENT: Try again?
MS. RATHKE: Yep. Try again.
Do you see a little photo?
MR. MARIANI: Yep.
THE DEPONENT: Yeah. I'm trying to.
BY MS. RATHKE:
Q If you hover over the box, there's a series of three round things on the lower right-hand side of the exhibit box. The top one is, like, a geometric situation. And if you hover over that, it says "fit to page." Hit the button that says "fit to page."

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A I just opened it in my system viewer.
Q All right. Exhibit 101 is a 2,500-time magnification of the area in the question that you're pointing to in your Figure 32.
Does that make sense to you?
A Yes.
Q And let me ask if Exhibit 101 helps resolve whether the sort of parallel up and down lines indicated kind of in the middle of the exhibit, whether those, in fact, are striations?
A Again, I've looked at this photo in the past. I'm not going to comment on it, whether it's a striation or progression mark. Either way to me it is an indication of fatigue.
Q Did you observe any parallel noncritical cracks in the surface layer of the bolts that would be consistent with the notion that the surface area of these bolts is inherently brittle?
A Well, if you go back to the previous image on my Figure 32 -- could you repeat your question? I want to make sure I'm answering the question that you asked me.
Q Yeah. Did you observe any noncritical cracks in the surface layer of the bolts -- and this is

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really relating to your oxidation point.
Did you observe any noncritical cracks in the surface layer of the bolts that would be consistent with the notion that the surface area of these bolts is inherently brittle?
A I saw evidence of cracking in the thread root and all of the -- all of the secondary cracks I would consider as noncritical because they did not progress to failure.
Q All right. And in page 49 of your report, you reference an SAE standard, specifically SAE AS7471.
A Correct.
Q And that you indicate is a standard that requires high-temperature oxides be removed from the bolt blanks prior to thread rolling, and the presence of the high-temperature oxidation layer is indicative of a manufacturing defect in the subject bolts.
Do you see that?
A Yes.
Q You should see momentarily what's marked on your screen as Exhibit 102.
(Exhibit No. 102 marked.)

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BY MS. RATHKE:
Q And if you could just let me know, confirm one way or another, whether that is the same SAE standard to which you are referring, that would be great.
A Okay. Now it's not refreshing at all.
Oh, there it goes.
Q It's a bigger document so it will take a little longer.
A SAE AS7471. I think that's what I referenced in my report. It appears to be the same standard.
Q Okay. Great. You produced calibration records for the tools and equipment that you used to conduct your analysis in this case, correct?
A I produced calibration records for the wrenches and micrometers that I used in my testing.
Q And that is because proper calibration is important for your micrometer and for the torque wrenches so that you can be certain that their measurements are correct; is that fair?
A To verify that they're working within their specifications, correct.
Q All right. I'm going to mark -- do you know how long torque wrench calibrations are good for?

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MR. MARIANI: Objection. Form. Incomplete hypothetical.
THE DEPONENT: Off the top of my head, no. I think it depends on the amount of usage. In any regard, the torque wrenches that I used were brand-new and the first time they were ever used after their calibration were for this testing.
BY MS. RATHKE:
Q Exhibit 103 should come up on your screen.
(Exhibit No. 103 marked.)
BY MS. RATHKE:
Q And I'll ask if you recognize Exhibit 103 as a calibration document from your files.
A One moment. I'm waiting for it to load.
Q You bet.
A Yes.
Q The first page of Exhibit 103 pertains to a 50 foot-pound torque wrench that your shop uses, correct?
A Yes.
Q And the reason that you produce this is because this 50-pound torque wrench was used in your investigation in this case; fair statement?
A Correct. It was purchased for this case.

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Q And when did you purchase torque wrenches for this case?
A I purchased it in January of 2020.
Q Did you have torque wrenches in your possession before January 2020?
A I have several calibrated torque wrenches, but I did not have a torque wrench to cover the range that I needed for this particular application. And the other torque wrenches I had were clicker-style torque wrenches, and I wanted to use one with an indicator on them.
Q So which torque wrench does the first page of Exhibit 103 pertain to?
A This pertains to -- this torque wrench goes up to, I believe -- this is the one that we used for the higher torque load measurements, I think over 50 or 60 -- 50 or 75 inch-pounds.
Q So because Exhibit 103 indicates the last calibration date of November 12th, 2018, fair to say that you did not buy this particular torque wrench new for this case, in January 2020?
A No, that's incorrect. That's just when it was made and it sat on a shelf.

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Q What is?
A The calibration date is from when it was manufactured and then it sat on a shelf until somebody purchased it. It was a brand-new torque wrench.
Q All right.
A The calibration date is probably from when it was manufactured.
Q Okay. So if I'm understanding you correctly, the calibration date for the brand-new torque wrench that you bought was 11-12-2018, according to Exhibit 103?
A Correct.
Q Got it.
Is Exhibit 103 the most recent calibration certificate that you have for that particular calibration wrench -- for that particular torque wrench?
A Yes, because it was a brand-new torque wrench, and it's not up for calibration. It won't be up for calibration on our end again until next year. That's why there's an in-service date below there on the specification. So it says "One-year calibration integral recommended.

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User must determine the best interval date and time and usage."
Well, this was a brand-new torque wrench. It was never used before 2020. So now we won't be calibrating it for another year, or a year from January 2020. Actually, it'll be in our calibration log on our tool system in my office.
Q And where did you buy it from?
A I bought it from an online tool distributor. Either MSC Industrial or Zoro. I don't remember which.
Q Why did you prefer not to use your -- I think you called it a click-style torque wrench that you already had in your possession.
A Well, I had another torque wrench that was a high-range inch-pound torque wrench that was a click-style wrench, which it gives you a click. You set it and then it gives you a click when you reach the acquired torque.
I wanted to be a little bit more accurate by watching the gauge in order to get the precise number so I could creep up on the torque properly. So I wanted one with a dial or a digital display so I could accurately read the

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numbers so I know I was reproducing the torque numbers correctly.
Q So after you purchased the new torque wrench that -- to which Exhibit 103 pertains, grand total how many torque wrenches did you own?
A Do I own personally or through my business?
Q Through your business.
Did you buy 103 through your business or did you buy it personally?
A No. I bought these through my business. Personally, I probably own eight torque wrenches. My business owns seven or eight. Most of them are larger-style ones. We don't do much on the small-bolt world. So like I said, I wanted to get a low-end torque wrench.
The only other torque wrench I have for doing small inch-pound measurements is actually a screwdriver style that does, like, 0 to 10 inch-pounds.
Q Okay. Have you read Mr. Cheyne's report?
A Yes.
Q I'm not going to burden the record too much by throwing in additional exhibits, but Mr. Cheyne sets forth four factors in his report that he

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says in combination caused the diffuser bolts to fail. And I'm going to ask if you agree with his words. Okay?
A Can you tell me what part of the report -- are you talking about his opinion on paragraph 15?
Q Yes.
MR. MARIANI: Also, I'm going to object. I don't have this document handy. So if you're not posting it, we'll have to wait until I can locate it elsewhere.
Do you plan to introduce it or no?
BY MS. RATHKE:
Q Okay. If you look on your screen, Mr. Cheyne's report is introduced as 104.
Do you agree with that, Mr. Jones?
(Exhibit No. 104 marked.)
MR. MARIANI: I don't have the document opened yet. So can you please wait a minute when you introduce an exhibit to the other lawyers, the courtesy to open the document when you proceed with questioning. This is happening --
MS. RATHKE: I don't even recall you giving me copies of documents of previous depositions.

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MR. MARIANI: I don't know what that has to do with the courtesy of waiting for somebody to open a document.
I've got it open. Please go ahead.
BY MS. RATHKE:
Q All right. Paragraph 15 of Mr. Cheyne's report, which is now marked as Exhibit 104.
Are you with me, Mr. Jones?
A Yes.
Q He states: "Based on my experience and a thorough review of the evidence, it is most likely that a combination of factors caused the failure. A: Higher frictional forces when installing used bolts in second- or third-run engines led to a lower clamping force at the specified torque."
Agree or disagree?
A I agree with that opinion. That's my opinion as well.
Q "B: This combined with the known differential expansion of the parts during the required installation heating led to low preloads on the bolts/joint."
Agree or disagree?

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A I think it's a possibility.
Q "C: The low preload joint clamping force then led to loose bolts which allowed bolt vibration in the assembly."
Agree or disagree?
A I agree that the fatigue fractures were due to a lack of preload, not too much preload. Yes, I agree with that statement, that low preload led to loose bolts which allowed vibration and which allowed them to fracture.
Q You believe that the bolts, in fact, were loose?
A They did not have sufficient preload.
Q "D: This, in turn, caused cracking at the thread roots adjacent to the first engaged thread of the nuts with subsequent fatigue, progression, and failure."
Agree or disagree?
A I agree with that statement.
MS. RATHKE: All right. I have no further questions.
MS. SUSZYNSKI: I have a couple. Give me just a second.
THE DEPONENT: I'm sorry. Who is this?
MS. SUSZYNSKI: I was going to say.

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Mr. Jones, my name is Casey Suszynski, and I represent Textron in this matter.
THE DEPONENT: Nice to meet you.
MS. SUSZYNSKI: You as well.
EXAMINATION
BY MS. SUSZYNSKI:
Q You testified that you aren't sure, but you think Textron may have manufactured the bolts at issue; is that correct?
A Yes.
Q Do you know offhand which part number you're referring to when you say that?
A I'm thinking specifically of the nuts because I purchased the nuts independently of receiving them from Dallas Airmotive. And for some reason when I looked up the part number on various websites, and I could be mistaken, but for some reason I thought that they kept referencing it as a Textron bolt or a Textron nut.
Q You purchased nuts -- when did you purchase the nuts that you're referring to?
A In January 2020.
Q And what's the part number of the nuts you purchased?

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A ST6317-09.
Q Do you have receipts from that purchase?
A I'm sure they're somewhere in our artifacts.
Q Would those receipts show if it was manufactured by Textron?
A I don't know. Let me see if I can find it.
Q Yeah. That would be great. Thank you.
A Maybe I didn't buy them. Hold on one second.
Q Sure.
A I apologize. I don't have that handy.
Q Okay. And you stated as you were looking that you may not have even purchased the nuts now; is that correct?
A No, no. I was looking at the wrong website. I was looking at a different receipt for something else.
Q Okay. Do you recall actually buying the nuts in January 2020?
A Yes.
Q Okay. And, again --
A Easier way if you search online -- I think if you search online you'll probably find it.
Q Well, let me ask you this: The bolts at issue that failed were not manufactured in 2020 or for

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sale in 2020, correct?
A I don't know when they were manufactured.
Q Well before 2020, correct?
A I would assume so but I don't know. Oh, you mean the subject bolts, yes.
Q Correct.
Do you know when those were manufactured?
A No, I do not. You mean the subject bolts or the bolts I tested?
Q The subject bolts, sir.
A No, I do not know when they were manufactured.
Q Do you know when the bolt --
A Let me explain to you, probably help you out and make your life a little bit easier.
Q I'll let you do that.
A If you go to some website -- and like I said, I could be wrong, but if you go to some website and you push the part number for the nut in, it will say -- I'm looking at a site right now called Air Power Inc. And it says right there, "Air frame parts, Continental Engine, Cessna part number ST6317-09 nut, self-lock shank." And I think that may have been why I thought they were manufactured by Textron.

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Q Okay. But my -- why it doesn't make my life easier, sir, is because you have told us today that you think there's a manufacturing defect that contributed to the failure, correct?
A I was referring to the bolts, not the nuts.
Q Okay. So you have no evidence to support any assertion that the bolts were manufactured by Textron or Cessna?
A I don't see evidence of that.
Q Okay.
A The nut is what I -- and if I said that earlier, I'm going to correct it right now because just doing my quick Internet search while we've been discussing this, it was the nut that I had purchased that I saw that the Textron lead to.
Q Okay. Sir, do you have any opinion that the nut caused or contributed to the accident?
A No, ma'am, I do not.
MS. SUSZYNSKI: That's all I have, then. Thank you.
MR. MARIANI: I have some questions for the witness as well.
EXAMINATION
BY MR. MARIANI:

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Q Mr. Jones, do you recall you were asked some questions early in the deposition about your background and experience? Do you recall that?
A Yes.
Q Can you tell me, do you have any firsthand experience doing mechanical work on any type of engines?
A Yes. I worked at an engine assembly business that my family owned for many years. I worked at my family's truck dealership doing engine rebuilding and machining work. I also still to this day build racing engines for people and myself.
Q Okay. And when you say "racing engines," can you tell us a little more what you're speaking about.
A Sure. I built many different -- I've built even custom engines. I've built V8s cut in half for racing applications that are now V4s. I'm presently building a 2-liter Honda that will be making approximately 350-horsepower naturally aspirated. I've built probably in my lifetime over 300 automotive and diesel engines, if not more.

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Q Okay. And in the engines you've worked on over the years, both ones manufactured by others as well as ones you've built yourself, do you run into the issue of bolted joints and torquing up bolts in the engines?
A On a regular basis, engines -- automotive and diesel engines, just like jet turbine engines, also have a whole series of torque specifications and requirements that must be followed.
Q Okay. And in this case, did you find that your work that you were asked to undertake, did that work involve principally the issue of a bolted joint?
A Yes. My understanding was -- what I was retained to do was investigate the failure of the bolt and the relationship to the joint, the bolted joint at issue here.
Q And -- go ahead. I interrupted you.
A No, no. Nothing.
Q Okay. And for purposes of your work on this case, because this bolted joint happens to be in an aircraft turbine engine, the fact that you've never personally disassembled and reassembled an

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aircraft turbine engine, did that affect your ability in any way to examine this bolted joint?
A In this particular case, no. I mean, I've worked on steam turbines and other types of turbines that have been exposed to similar types of operating conditions, temperature, you know, issues with temperature, joint stiffness and things of that nature in the past, let alone the fact that we've been numerous -- have been involved with, led, or participated in numerous fatigue investigations over the years.
And to that note, I would just add to that, that in my experience, that most bolted joint fatigue failures are related to insufficient preload or joint design issues. I can't personally think of a time in my career where I've -- possibly I may have, but where I've encountered a bolt that was overtorqued to the point where it was cracked and led to a failure.
Q Okay. You were asked a number of questions early by counsel about your experience with aircraft accident investigation, aircraft safety classes. Do you recall that line of questioning?

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A Yes.
Q Is it your understanding in this case, there was no accident or crash; is that correct?
A That's my understanding. My understanding, the bolts were found during an inspection.
Q And the aircraft was on the ground when the bolts were found broken; is that right?
A That's my understanding.
Q Was there any aircraft accident for you to investigate in this case?
A Not that I'm aware of.
Q Okay. Do you recall Ms. Rathke was asking you questions about whether, when the bolts broke off on the subject engines, whether it caused damage to other parts in the engine?
A Yes.
Q And do you recall she asked you about whether a combustion liner sustained some dents?
A Yes.
Q Are you aware that Menard's in this case has admitted that it's not seeking damages for anything in the case related to any other damages on the engine?
MS. RATHKE: Object to foundation.

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BY MR. MARIANI:
Q You can answer.
A I was not aware of that. I restricted my investigation to the technical issues.
Q Okay. Now, do you recall you were asked some questions about the West Virginia engine disassembly that occurred and protocol that was provided in relation to that -- sorry. Let me withdraw that for the moment.
Let me ask you about your information that you have with regard to Pratt & Whitney and the information that it disseminated regarding these subject bolts. Are you aware of Pratt & Whitney having put out some information in and around the time that the Menard bolts were discovered to be broken?
A I'm aware of the service bolt, and that was published recommending replacement of the bolts on wing.
Q And based on your experience and knowledge on parts of this nature, can you come up with any explanation for why a manufacturer like this would recommend the replacement of the bolts on wing if there was absolutely no problem with the

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bolts?
MS. RATHKE: Object to form and foundation.
BY MR. MARIANI:
Q You can answer.
A Sorry. The lights just went off.
No, I can't think of a reason other than -- I can't think of a reason why they would recommend replacing them on wing like that unless there was a concern on their end.
Q Okay. Let me show you what we've marked now as Exhibit 105.
(Exhibit No. 105 marked.)
BY MR. MARIANI:
Q You can look and see if that should be available in the exhibit folder. Tell me if you're able to see that.
A One moment.
Yes. I have it.
Q Okay. And have you seen Exhibit 105 before today?
A Yes, I have.
Q And approximately when did you receive that?
A May 28.
Q What's your understanding about what Exhibit 105

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is?
MS. RATHKE: Object to foundation.
BY MR. MARIANI:
Q You can answer.
A What I see here is that it says now to discard the bolts from the gas generator diffuser assembly. And if it says discard them, it must be -- implies that new bolts will be installed upon assembly.
Q And when you say "it says," what are you referring to? What's your understanding about where this data is coming from?
A Okay.
MS. RATHKE: Same objection.
MR. MARIANI: Hold on one second, Aaron. What's the basis for the objection?
MS. RATHKE: Foundation.
BY MR. MARIANI:
Q Okay. You can answer.
A This is Bates numbered. Under Section 28, Diffuser Assembly, you'll see on the left-hand side of the page there's a vertical bar next to No. 6. That vertical bar, I believe, means there's been a revision. And as you can see

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there, it tells the overhauler to remove and discard the bolts from the diffuser assembly.
Q Okay. And is this information that my office provided to you?
A Yes, it is.
Q Okay. And is it your -- what's your understanding as to the original source of this data?
A I believe it came from Pratt & Whitney as it looks like their manual.
Q And is what you see here in your -- is it your view that this is somehow related to the service instruction you were telling us about that came out earlier?
MS. RATHKE: Object to foundation.
BY MR. MARIANI:
Q Go ahead.
A It appears to be consistent with the service recommendation because now they're requiring it within the disassembly and overhaul manual.
Q In your experience, have you seen any instance where a manufacturer would require a change like this when there's absolutely nothing wrong with the part in question?

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A Not in my experience.
Q Do you recall that you were asked some questions earlier about the location of certain Dallas Airmotive records related to one of the three engines in question?
A Yes.
Q Are you aware that the FAA requires repair companies, licensed repair companies like Dallas Airmotive, to retain records only for two years post-overhaul?
A No.
Q And do you recall Ms. Rathke mentioning that to you when she asked you questions about where those records were?
A No.
Q You had discussed earlier that the bolts in question, the subject bolts have a -- at least the subject ones and others have a manufacturing defect with respect to this oxide on the outside in the bolt.
Do you recall that?
A Yeah. Yes.
Q Okay. And do you have any information at your disposal presently to tell you what percent of

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bolts installed in Pratt & Whitney 530A engines have that same manufacturing defect?
A You mean encompassing all the engines?
Q Correct. All the Pratt & Whitney 530As that are out there operating.
Do you know of those that are out there operating what percentage of those have bolts installed in the diffuser that do have the manufacturing defect?
A No, I do not.
Q And do you recall a series of questions that Ms. Rathke asked you before regarding why it was, in your understanding, that there were a handful of engines that have been discovered, 530As with broken bolts, but all these other 530As are out there operating. They so far haven't been reported to have broken bolts.
Do you recall that line of questioning?
A Yes, I recall that.
Q And how would this issue of the manufacturing defect on some but perhaps not all bolts, how would it relate to that topic?
A I'm sorry. Could you repeat that question again?

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Q Sure.
A I'm sorry. My air-conditioning kicked on and it's hard for me to hear.
Q That's okay.
Does the fact that you don't know what percentage of those Pratt & Whitney 530A engines that are out there operating have bolts with the manufacturing defect, does that have some relationship to explaining why only a handful of 530s have come in with broken bolts?
MS. RATHKE: Hey, Richard. I'm having trouble hearing -- I think it might be Ray's Internet connection. I don't know if anybody else is having trouble hearing him.
Richard, can you read back that last question.
(Record read.)
THE DEPONENT: It's entirely possible. I also add that it seems to be a problem limited to the 530 as well that you're not seeing these failures on other bolts. So I suspect it's -- like I said, it's a combination of the bolt and the joint that's contributing to it.
\\\

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BY MR. MARIANI:
Q And what's the principle distinction in your opinion that's relevant between the 530 versus the other Pratt & Whitney 500 series engine?
A As I previously testified, it's going to be the stiffness of the joint as it relates to the material choice between the 530 and the other engines.
Q And "material choice," referring to which engine part?
A The diffuser housing.
MS. RATHKE: You're hard to hear.
MR. MARIANI: I'm speaking as loudly as I can, so I am doing my best.
BY MR. MARIANI:
Q So when you say "material choice," referring to which engine part?
A The diffuser housing. The diffuser housing on the PW530A is titanium alloy and the remainder appear to be a steel alloy.
Q Did you find anything noteworthy with regard to the serial numbers on the Pratt engines that have experienced the bolt failure?
A They seem to fall between -- the lowest number

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we have is the 169, and it goes to 687. We don't see any above or below that date. There seems to be a range in there. I just don't have enough information to draw further correlation with that to real-world failures.
Q And do you recall Ms. Rathke asked you a number of questions about whether you asked Pratt & Whitney for data about certain things?
A Yes.
Q And are you aware that Pratt & Whitney is no longer a party defendant in this lawsuit?
A Yeah. I'm aware of that now.
Q Right. Are you aware that Ms. Rathke's client, Menard, dismissed them from the lawsuit?
A No. I am now.
Q And are you aware that Ms. Rathke's client, Menard, dismissed them prior to that provision manual coming out that we've marked as Exhibit 105?
A I am now.
Q Okay. Now, do you recall there were some questions regarding the West Virginia inspection where Mr. Meyers removed certain bolts from the subject engines?

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A Yes.
Q Okay. So we've marked as Exhibit No. 106, the protocol that was provided to us by Mr. Meyers via Menard. So see if you can open up Exhibit 106 at this time.
(Exhibit No. 106 marked.)
THE DEPONENT: Okay. I have it open.
BY MR. MARIANI:
Q Okay. And look that over and tell me what you see on there, if anything, with regard to the breakaway torque being used?
A It says "Characterize bolt torque and/or bolt stretch to subject bolt installed on the engine."
Q All right. Do you recall Ms. Rathke asked you questions? She didn't show you this document before, do you remember, but she asked you questions about it where she was saying to you isn't it true that this document was approved by all the parties before the inspection?
Do you recall that?
MS. RATHKE: Object to foundation.
THE DEPONENT: Yes.
\\\

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BY MR. MARIANI:
Q And now that you see the document that you weren't shown before when she questioned you, now you can see in the document there's absolutely no mention about Mr. Meyers doing anything with regard to how he was going to measure breakaway torque, what instrument he was going to use, whether he was going to put the bolts back in and take them out again.
Do you see that now that you're actually getting to see the document?
A It's pretty vague. It just says characterize bolt torque and/or stretch.
Q Does the word "characterize" -- to you as somebody who is an engineer and a very experienced mechanic, does the word "characterize" when you see it on a protocol tell you something that someone is going to physically do something with their hands, remove parts and put them back in again?
A To me No. 4 is pretty vague. It's very vague simply because it doesn't indicate methods or procedures for performing whatever characterization that they want to perform --

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wanted to perform.
Q If you were going to draft a protocol and wanted to actually tell somebody what you were doing, not hidden from them but disclose it in advance how you were going to do breakaway torque, would you use the words, quote, "characterize bolt torque," quote, or would you use some other words to describe the process of removing bolts?
MS. RATHKE: Object to the form.
BY MR. MARIANI:
Q You can answer.
A Typically when I perform an inspection type as this regarding bolt torques and things of that nature, typically I put the procedure in that I plan -- or intend to use before I show up.
Q And would you expect on a protocol that's going to involve the removal of bolts to try to measure breakaway torque, would you expect the words, quote, "breakaway torque," quote, would be included in the protocol?
MS. RATHKE: Object to the form.
THE DEPONENT: Typically what I would say -- I would expect in a protocol would be measure breakaway torque and the tightening

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direction, measure breakaway torque in the loosening direction, or something like that. That's fairly common on bolt inspection protocols that I've seen and written.
BY MR. MARIANI:
Q Do you see anything like that in this protocol that Mr. Meyers sent us via Menard's lawyers?
A No. No. In fact, I probably object to measuring bolt stretch because it's irrelevant, as discussed in my report.
Q Okay. Thank you very much.
I'm going to pull up another exhibit. Give me one second.
Do you recall Ms. Rathke asked you some questions before about an NTSB report that Mr. Meyers was relying on?
A Yes.
Q Okay. And that's Exhibit 99, which I'm now opening again. And can you open Exhibit 99 as well?
A Yes. Give me one moment, please.
Yes, I have Exhibit 99 open.
Q Okay. And do you recall when Ms. Rathke questioned you, do you recall her reading the

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analysis but stopping at the end of the sentence that said -- the sentence that reads, quote, "One not on the No. 4 connecting rod it also backed off but had not failed," closed quote.
Do you recall that and then she jumped to page 4?
A Yes.
Q Okay. So let's now read together what continues on that page that she did not read to you.
Quote: "Bolt preload is related to installation torque, but with many variables such as lubrication, thread deformities/variations, rough surfaces and contamination. Torque tests showed a variance of 18 to 25 percent of torque values between the tightening and loosening of the nut. The breakaway torque value were within the range of test values for properly torqued nut; however, due to the uncertainty of the readings, no conclusion can be drawn as to the adequacy of the original installation torque."
Do you see what I just read in, Mr. Jones?
A Yes.
Q What do you draw from the NTSB saying no

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conclusion can be drawn from the adequacy of the original installation torque? What does that mean to you?
A It means to me -- based on my reading of this, they're not putting a lot of stock in their test.
Q Okay. And when we went to page 4 earlier, Ms. Rathke was questioning you on page 4, and she asked you if the NTSB in this instance was trying to measure the torque that had been applied.
Do you recall that?
A Yes.
Q If you're trying to measure torque that's supposed to be set to 480 inch-pounds, can you possibly do that under the rules of physics with a wrench that only goes to 300 inch-pounds?
A Well, you can certainly break it away but you would not receive a measurement.
Q You would never know if it went to over 400 if the wrench you're holding only goes up to 300; is that true?
MS. RATHKE: Object to the form.
THE DEPONENT: That's correct.

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BY MR. MARIANI:
Q Okay. Let's take a look at your report, if we could, which has been previously marked as Exhibit No. --
A Okay. I have it open.
Q Sorry. I just need to get the number.
Okay. Exhibit 91.
So if you can go to page 36 as numbered at the bottom, Bates number 5540, and tell me when you reach that.
A I'm sorry. I heard you say turn to page 36 and then I lost you there.
Q I'm just giving the corresponding Bates number, 5540.
A Okay.
Q Are you at that page?
A I'm on page 36 of my report.
Q Okay. And do you recall Ms. Rathke asked you questions about your discussion at the bottom of page 36 where you had commented about the Bolt No. 15 which showed residual Never-Seez.
Do you recall that?
A Yes.
Q And then do you recall she went to the next

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page, and she pointed you to Figure 26 and said to you "Why do you have Bolt No. 3 there when you were talking of Bolt No. 15?"
Do you recall that discussion?
A Yes.
Q Now, take a look at the top of page 37. Do you discuss Bolt No. 3 on page 37?
A Yes, I do. I discuss it on page 37.
Q Please read into the record what you stated there.
A "While inspecting the bolts -- while inspecting the bolts that had been removed from the subject engines, Fusion Engineering noted significant changes to the nature of the Never-Seez remaining on the bolts. The Never-Seez on the removal of bolts appeared dried and cracked as shown on Bolt 3 from DAO687 in Figure 26. Contrastingly, fresh Never-Seez has an oily, wet appearance and tends to flow to some degree when applied to the bolt as shown in Figure 27.
"NASA publication 1228, referenced several times by Mr. Meyers, indicates that Never-Seez is satisfactory as a one-time lubricant. It also indicates that oil within Never-Seez boils

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off during temperature exposure but the compound leaves non-galling oxides of nickel, copper, and zinc between the threads."
Q Thank you.
And so was your reference of your insertion of Bolt No. 3 on that page by accident or was that intentional by you?
A No. As I stated before, it was intentional because it was a good image that showed exactly what I was speaking to. On Bolt No. 15 that Mr. Meyers tested had been dipped in -- or coated with turbine oil. So it did not have the same appearance as the remainder of the bolts that were removed from the engine.
Q Okay. Do you have an understanding with regard to -- well, let me withdraw that.
Do you recall you had a discussion with Ms. Rathke earlier with regard to the process of mechanics in different maintenance shops, such as Dallas Airmotive or Pratt & Whitney of West Virginia, performing the installation of the diffuser with the diffuser bolts and there being potentially slight variations with regard to their installation process when they're doing

that.
Do you recall this discussion?
A Yes.
Q Is it your understanding when the torque is applied to the bolts, is there only one number specified by the Pratt & Whitney manual for the torque value or is it a range of torque that can be applied?
A It's a range of torque.
Q So is it your understanding that when the mechanics are doing this in two different shops, that they could be applying different torque when they put the bolts on, but both shops in both mechanics are doing the job according to the manual?
A That's possible. And there's also a contribution to air from the torque wrench, even though it's calibrated because the torque wrench also has an air associated with it.
Q And did you reach a conclusion in your work that with regard to these potentially slow variations in the install process could potentially have some effect with regard to the life of these bolts?

A Well, absolutely, because -- as I think I testified earlier is the preload on these bolts at room temperature is very, very low. It's well less than half of the yield strength of the bolt, which is, from an engineering perspective, a very low preload for a fatigue perspective.
So if you have something that's torqued or preloaded to a very low preload to begin with and now you start getting small variations, you're going to increase your likelihood of fatigue because the scatter in the preload will be higher.
MR. MARIANI: Okay. I don't have any further questions at this time.
Does anybody else have questions for the witness?
MS. RATHKE: I have one follow-up question.

EXAMINATION

BY MS. RATHKE:
Q Mr. Jones, you referenced a racing background. Is that Go-Karts?
A I've raced Go-Karts, midgets, cars, sprint cars.
MS. RATHKE: Okay. No further questions.
MR. MARIANI: Casey, do you have anything

else?
MS. SUSZYNSKI: I don't. Thank you.
MR. MARIANI: Okay. Then the deposition is concluded.
Thank you very much, Rich, our reporter, for your cooperation today.
(Signature reserved.)
(Deposition concluded.)

CERTIFICATE

I, Richard D. Ehrlich, a Certified Shorthand Reporter of the State of Illinois, CSR License No. 084-2019, do hereby certify that I stenographically reported the proceedings had at the Zoom deposition, as aforesaid, and that the foregoing transcript is a true and accurate record of the proceedings had therein.
IN WITNESS WHEREOF, I do set my hand at Chicago, Illinois, this 29th day of June, 2020.

Richard D. Ehrlich
Certified Shorthand Reporter
License No. 084.2019

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June 29, 2020

To: Raymond L. Mariani

Case Name: Menard, Inc. v. Textron Aviation, Inc., et al.

Veritext Reference Number: 4122884

Witness: Aaron Jones Deposition Date: 6/12/2020

Dear Sir/Madam:

Enclosed please find a deposition transcript. Please have the witness review the transcript and note any changes or corrections on the included errata sheet, indicating the page, line number, change, and the reason for the change. Have the witness' signature notarized and forward the completed page(s) back to us at the Production address shown above, or email to production-midwest@veritext.com.

If the errata is not returned within thirty days of your receipt of this letter, the reading and signing will be deemed waived.

Sincerely,

Production Department

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DEPOSITION REVIEW
CERTIFICATION OF WITNESS

ASSIGNMENT REFERENCE NO: 4122884
CASE NAME: Menard, Inc. v. Textron Aviation, Inc., et al.
DATE OF DEPOSITION: 6/12/2020
WITNESS' NAME: Aaron Jones

In accordance with the Rules of Civil Procedure, I have read the entire transcript of my testimony or it has been read to me.

I have made no changes to the testimony as transcribed by the court reporter.

_____ _____
Date Aaron Jones

Sworn to and subscribed before me, a Notary Public in and for the State and County, the referenced witness did personally appear and acknowledge that:

They have read the transcript;
They signed the foregoing Sworn Statement; and
Their execution of this Statement is of their free act and deed.

I have affixed my name and official seal this _____ day of_____, 20____.

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DEPOSITION REVIEW
CERTIFICATION OF WITNESS

ASSIGNMENT REFERENCE NO: 4122884
CASE NAME: Menard, Inc. v. Textron Aviation, Inc., et al.
DATE OF DEPOSITION: 6/12/2020
WITNESS' NAME: Aaron Jones

In accordance with the Rules of Civil Procedure, I have read the entire transcript of my testimony or it has been read to me.

I have listed my changes on the attached Errata Sheet, listing page and line numbers as well as the reason(s) for the change(s).

I request that these changes be entered as part of the record of my testimony.

I have executed the Errata Sheet, as well as this Certificate, and request and authorize that both be appended to the transcript of my testimony and be incorporated therein.

_____ _____
Date Aaron Jones

Sworn to and subscribed before me, a Notary Public in and for the State and County, the referenced witness did personally appear and acknowledge that:

They have read the transcript;
They have listed all of their corrections in the appended Errata Sheet;
They signed the foregoing Sworn Statement; and
Their execution of this Statement is of their free act and deed.

I have affixed my name and official seal this _____ day of_____, 20____.

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Notary Public

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Commission Expiration Date

ERRATA SHEET
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Wisconsin Rules of Civil Procedure

Chapter 804, Depositions andDiscovery

Section 804.05

(6) Submission to Deponent; Changes; Signing. If requested by the deponent or any party, when the testimony is fully transcribed the deposition shall be submitted to the deponent for examination and shall be read to or by the deponent. Any changes in form or substance which the deponent desires to make shall be entered upon the deposition by the officer with a statement of the reasons given by the deponent for making them. The deposition shall then be signed by the deponent, unless the parties by stipulation waive the signing or the witness is ill or cannot be found or refuses to sign. If the deposition is not signed by the deponent within 30 days after its submission to the deponent, the officer shall sign it and state on the record the fact of the waiver or of the illness or absence of the deponent or the fact of the refusal or failure to sign together with the reason, if any, given therefor; and the deposition may then be used as fully as though signed unless on a motion to suppress under s. 804.07 (3) (d) the court holds

that the reasons given for the refusal or failure to sign require rejection of the deposition in whole or in part.

DISCLAIMER: THE FOREGOING CIVIL PROCEDURE RULES ARE PROVIDED FORINFORMATIONAL PURPOSES ONLY. THE ABOVE RULES ARE CURRENT AS OF APRIL1, 2019. PLEASE REFER TO THE APPLICABLE STATE RULES OF CIVIL PROCEDURE FOR UP-TO-DATE INFORMATION.

VERITEXT LEGAL SOLUTIONS
COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

Veritext Legal Solutions represents that the foregoing transcript is a true, correct and complete transcript of the colloquies, questions and answers as submitted by the court reporter. Veritext Legal Solutions further represents that the attached exhibits, if any, are true, correct and complete documents as submitted by the court reporter and/or attorneys in relation to this deposition and that the documents were processed in accordance with our litigation support and production standards.

Veritext Legal Solutions is committed to maintaining the confidentiality of client and witness information, in accordance with the regulations promulgated under the Health Insurance Portability and Accountability Act (HIPAA), as amended with respect to protected health information and the Gramm-Leach-Bliley Act, as amended, with respect to Personally Identifiable Information (PII). Physical transcripts and exhibits are managed under strict facility and personnel access controls. Electronic files of documents are stored in encrypted form and are transmitted in an encrypted fashion to authenticated parties who are permitted to access the material. Our data is hosted in a Tier 4 SSAE 16 certified facility.

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